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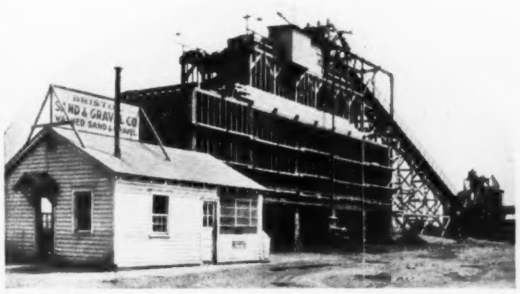
Volume XXXIIII — Chicago, May 10, 1930 — Number 10

New Sand and Gravel Operation for Philadelphia Territory

Bristol Sand and Gravel Co., Bristol, Penn., Has an Operation on the Delaware River Between Philadelphia and Bristol



Front view of office and plant, Bristol Sand and Gravel Co.

Digging a pit preliminary to floating a dredge, material being the source of company's sand and gravel

Pump house and canal dredged to main flow of the Delaware river

BY FAR the largest tonnage of sand and gravel that is shipped into the Philadelphia market territory comes from Tullytown, Penn., on the Delaware river. The Bristol Sand and Gravel Co.'s new operation is about six miles south of Tullytown and is the most southerly on the Delaware river, on the Pennsylvania side, and can be said to be on the southern extremity of the deposits that are the main sources of sand and gravel in that section. The southerly limits of the commercial deposits on the Pennsylvania side of the river appear to cut off at Neshaming Creek, a small stream that empties into the Delaware river a short distance below the plant of the Bristol Sand and Gravel Co., and about two miles south of Bristol, on what is locally referred to as the River road. The company owns here a tract of 205 acres of what was formerly known as the Weidemer farm.

The deposits of the Bristol Sand and Gravel Co. are close to the southerly limits, and, as would be expected from their origin, contain some clay material and loam along with the commercial sizes of sand and gravel. A considerable portion of gravel is of such size that it has to be crushed.

At Bristol the deposit has no overburden, and this gravel bed averages 30 ft. in depth, about 15 ft. of which is above water level. The bank averages 50% gravel, with the balance of the material sand and sand-clay mixture. Of the total gravel, 20% has to be crushed to reduce it to 1½-in. size, the largest size of gravel that is at present being produced.

The methods finally adopted to produce a clean material were only adopted after a thorough study had been made of other and in some cases distant plants having similar problems to contend with. The information that the company's engineers gathered from

Looking down into the log washers at the Bristol operation

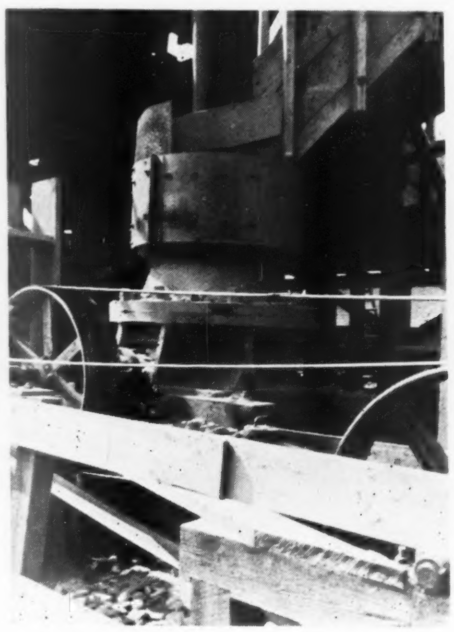
Primary and secondary crushers

these inspections backed by years of experience in the gravel business in this section was incorporated in the plant's design and has resulted in a high capacity plant capable of producing all classes of high grade sand and gravel from these ancient clay-bearing glacial drifts.

The outstanding features of this plant are the use of log washers through which all the sand, gravel and crushed gravel have to pass for a preliminary and thorough scouring. There is sufficient water and turbulence in the logs to carry the sands and clay along with the overflow waters to a sand drag where the sand is more or less scoured a second time before it is recombined with the log washers' discharge and conveyed to the sizing screens.

Novel Rotary Screen

There are also some novel features in connection with the arrangement of the perforations in the rotary screen, a clever and ingenious method James O'Toole, Jr., the general manager, has adopted and has incorporated in its design to give a graded gravel product in about as simple a manner as one could devise. This in essence consists in having the four quadrant plates that go to make up one section of the rotary screen of different sized perforations. To illustrate, one section has two quadrants of ⅝-in. round perforations, one quadrant of ⅞-in and one of ⅜-in. and all the materials that pass through these perforations produce what they call their ⅝-in. gravel. Similarly the end section has three quadrants of 1¼-in. round perforations and one quadrant of ⅞-in. and produces the ⅝-in. gravels. Only two sections are used for screening on the rotary screen; the first two sections act as a scrubber only.



This crusher takes the oversize from the end of the scalper

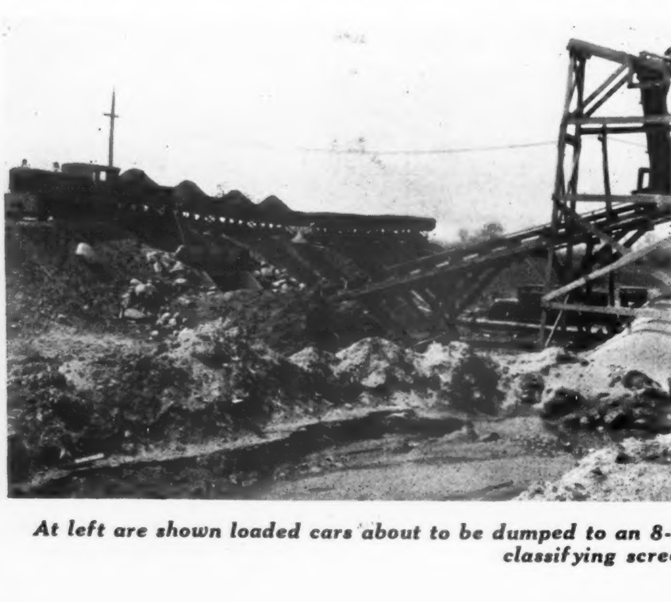
Unusual Crusher Arrangement

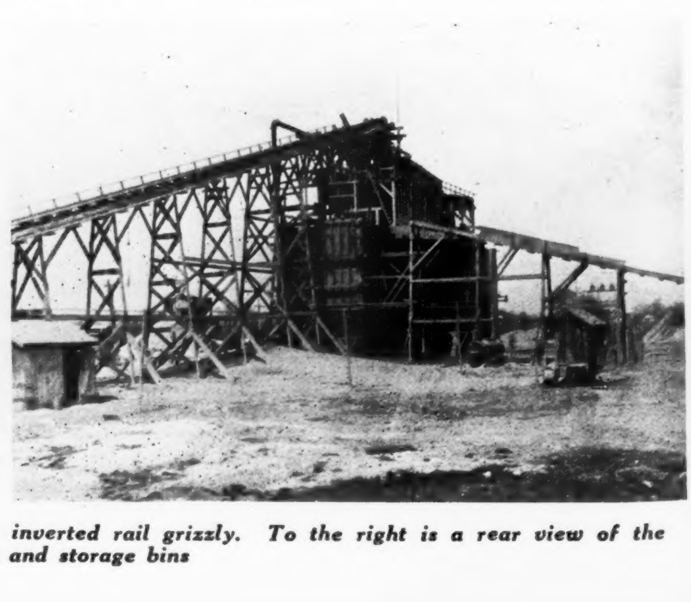
The arrangement of the two Telsmith crushers is also somewhat unusual. They are placed so that the oversize from the Telsmith rotary scalping screen passes to a 40-in. reduction crusher, while the coarser gravel is removed at a grizzly ahead of this scalper and falls to a No. 13-A primary breaker. The discharge products from both crushers fall to a belt conveyor that serves both the crushers, and the material is conveyed and elevated back to a point where it can again return to the preliminary screening system.

Plant Construction—Shipping Facilities

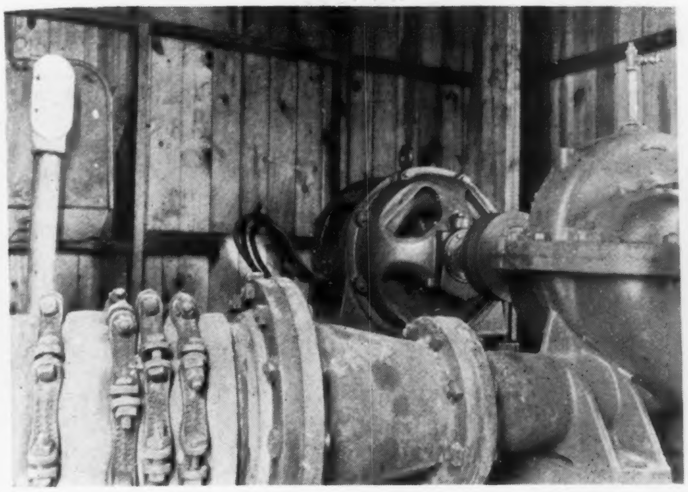
The plant is of wood construction throughout with the exception of the foundations of some of the equipment and these are of concrete. Ample space, paved with concrete, has been provided under the bins and about the yard to provide for safe trucking conditions in any kind of weather. The base of the storage bins is of dimension stone, making a novel method of bin supports. There has been no ill effect from the small amount of vibration on these walls and from their rugged appearance it is doubtful if there ever will be.

At present the company is shipping all of its product by trucks, under contract to local hauling companies. Rail shipments can be made by a short haul to a ramp where the trucks dump to cars spotted on a switch of the Pennsylvania railroad. All trucked material is weighed on 20-ton capacity Bennington scales equipped with the Howe illuminated weight reading system. Very shortly the company expects to build a dock at the plant and ship by barge to river points, and at that time will construct dis-





At left are shown loaded cars about to be dumped to an 8-in. inverted rail grizzly. To the right is a rear view of the classifying screens and storage bins




Showing motor connected to an 8-in. centrifugal pump for drawing water supply, and, at right, the pump house

tribution yards in the city of Philadelphia.

Pit Excavation

As construction work on the plant only started July 1 of last year, and the plant placed in operation the following September 1, a pit sufficiently large to float a dredge has not been dug, but as soon as there is a sufficient depth and area to float a dredge the company expects to install a suitable type dredge which will bring the plant up to its rated capacity of 2000 tons per day. At present a 1-yd. Erie steam shovel mounted on crawler treads is supplying the plant with its requirements. It was no mean construction feat to build and place in operation a plant of this size within a 90-day period.

Water Supply

Water for the washing operation is secured from the Delaware river. As the river at this point is subject to tidal fluctuations, a canal several hundred feet long has been dredged out towards the main stream channel. An 8-in. Worthington pump, its drive motor mounted on sheet and timber piling at the dividing line between the tide flats and higher ground is used. The 8-in. pump delivers 2000 g.p.m. at 140-ft. head, and is driven by a 100-hp. Westinghouse induction motor. To overcome the frictional loss in pumping the water to the plant, a distance of 1100 ft., flanged 12-in. water pipe is used between the pump and the washing plant instead of a much smaller pipe usually employed for such purposes. The pump and its motor operate at 1750 r.p.m. All of the motors operate on 440-volt, 60-cycle, 3-phase current, stepped down to that voltage by a bank of Westinghouse transformers.

The 8-in. discharge of the pump is belled to 12-in. with a bell reducer of the conventional type to which has been clamped a length of 12-in. diameter rubber hose about 12 ft. long, with the other end of the hose clamped to the 12-in. delivery pipe. While this method is not new, its use is by no means common and it has the advantage of readily taking care of any misalignment due to pipe expansion or pump vibration, etc., and could be used to advantage by other operators.

Water is pumped to the plant through 1100 ft. of 12-in. flanged wrought iron pipe

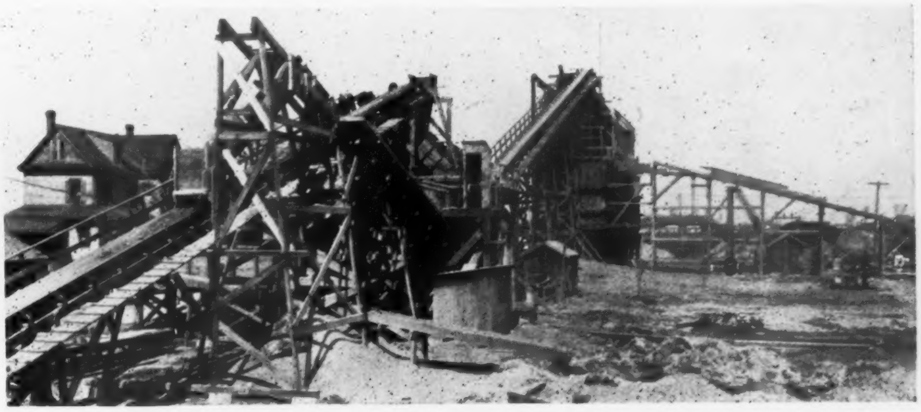
Pit Transportation

The Erie shovel loads direct to two trains of three to four cars each, using 5-yd. Koppel cars, with each train drawn by a 12-ton Vulcan gasoline driven locomotive. The track is arranged in the form of a loop with one leg going into the pit at quite a steep angle and the longer one used for hauling the loads. The grade is quite steep coming out of the pit but the locomotives handle the loads without difficulty.

The cars side-dump to an 8-in. inverted rail grizzly and any oversize hand sledged through the openings, although the amount of plus 8 in. is not large. Two men can easily take care of the dumping and grizzly work. As the material is somewhat damp, and owing to its clay content, the grizzly tenders have to poke the material down into the hopper where a Telsmith reciprocating feeder feeds the material to a 36-in. Goodyear, style W, conveyor belt. This belt is inclined at 18 deg. and operates on 141-ft. centers.

Screening and Washing

This 36-in. belt discharges to a second rail grizzly spaced at 2-in. centers, with the fines passing to a 48-in. by 20-ft. Telsmith scalping screen having the first section blanked to act as a scrubber. The remaining three sections all have round 1¾-in. perforations.



A view from the back of the plant showing belt conveyor, at left, which feeds the scalping screen. Conveyor beyond goes to the finishing screens

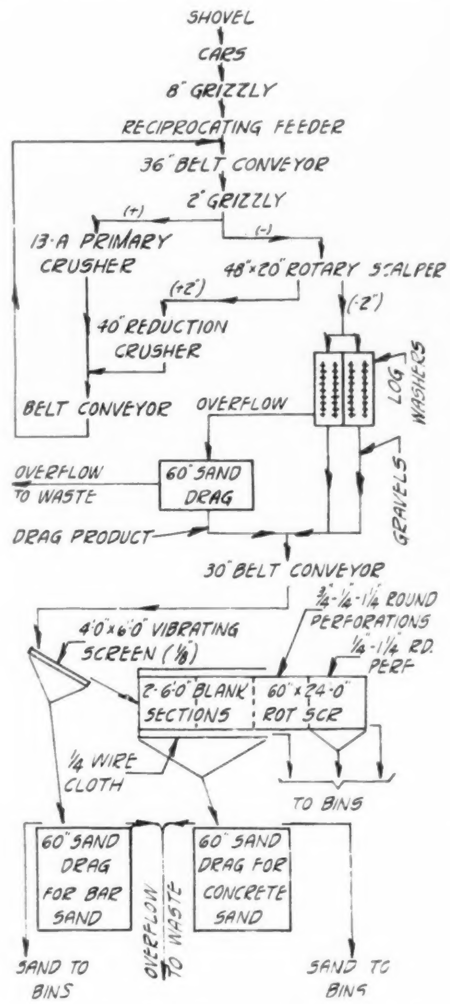
The oversize from the end of the scalper falls to a 40-in. Telsmith reduction crusher and the oversize from the 3-in. grizzly falls to a No. 13-A Telsmith primary breaker with the discharges of both crushers falling to a 24-in. belt conveyor, that returns the crushed gravel to the first mentioned 36-in. belt. The crushers are set to deliver a 1½-in. product.

The smaller crusher is driven by a 40-hp. Westinghouse induction motor through a belt drive. The larger crusher is driven also through a belt drive by a 40-hp. motor of the same make.

The fines from the rotary scalper fall to a launder having cast manganese-steel liner plates to take care of the abrasion due to this coarse material with the stream dividing and falling to the low end of two double flighted, 24-ft. McLanahan log washers, that are set at a pitch of 1 in. per ft. Approximately half of the total water supplied the plant is sprayed into the scalper and into the logs so that with the scouring that the gravel gets practically all of the adhering clay is loosened and passes out with the overflow waters. The two logs are driven by a single 100-hp. motor through a Texrope drive, with the usual gear and pinions at the log's high end.

The logs and the large amount of water flowing to them create sufficient agitation so that most of the sand is carried out with the overflow water to a Telsmith sand drag having 60-in. flights. The sand here receives additional scouring due to the scraping action of the classifier, so that by the time it is discharged to the 30-in. belt serving the sizing screens the clay has been thoroughly loosened.

The gravel from the logs is discharged to the same 30-in. belt, but at such a point above that the sand acts as a cushion on the belt for receiving the gravel. Here again is a point that while not unusual is one that is often overlooked, for some operators discharge sharp cutting aggregates on to a belt in a haphazard manner when a little thought might develop a method of so loading the belt that the non-cutting material would act as a bed.



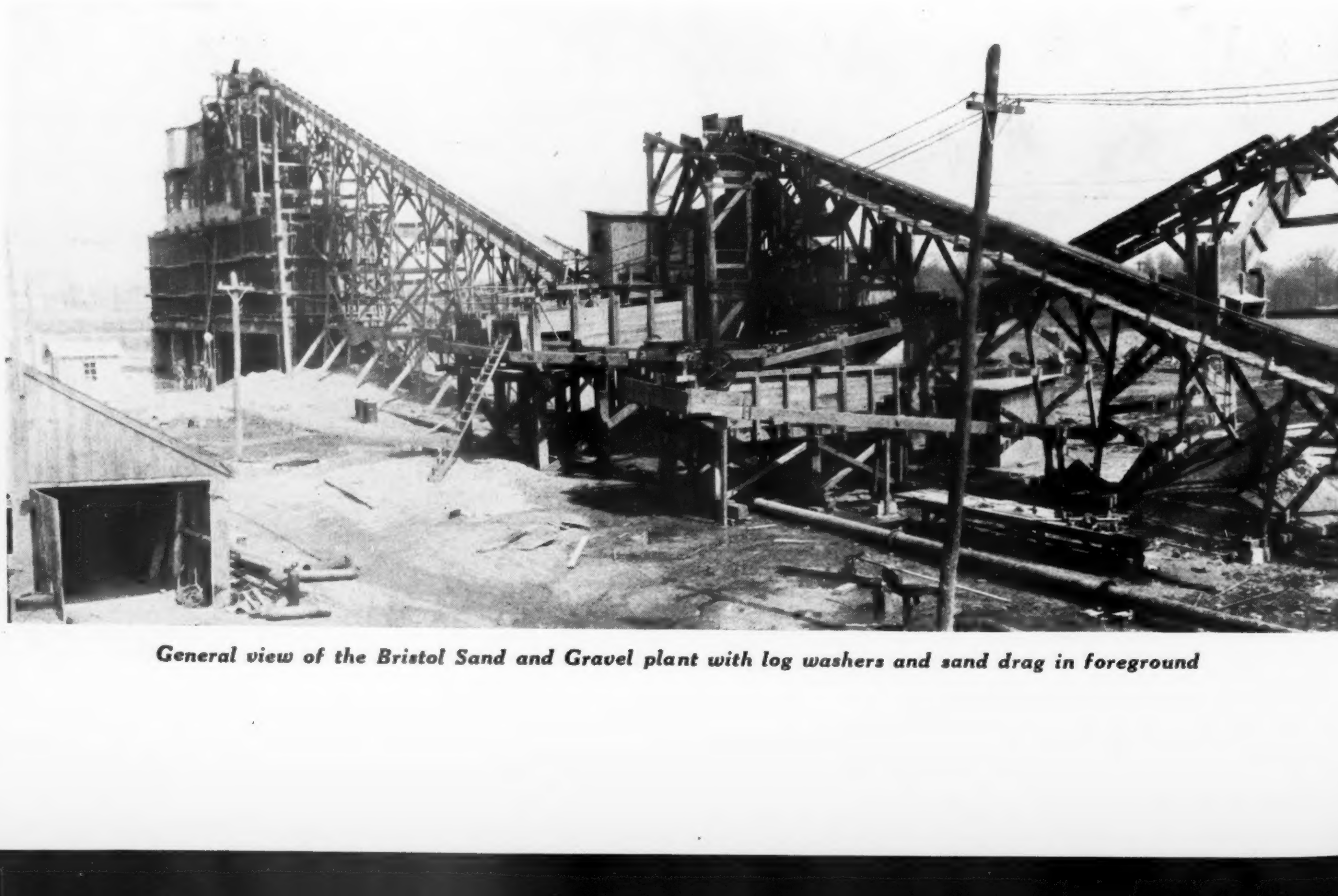
Flow sheet of the new Bristol Sand and Gravel plant, six miles south of Tullytown, Penn., on the Delaware river

This 30-in. belt is the longest in the plant —171 ft. center to center—and like the other two conveyors is carried on Stearns carrier rolls spaced at 4 ft. centers. The belt discharges to a single decked 4x8-ft. Niagara vibrating screen having ⅛-in. wire cloth, and the oversize falls direct to a 60-in. by 24-ft. Telsmith rotary sizing screen. The first two inner 6-ft. sections act as a scrubber, having blank plates, while the other two sections are arranged with the special quadrants as previously mentioned. The outer jacket has three sections of ¼-in. square wire-mesh cloth. The three sizes of gravel produced, ⅝-in., ¾-in. and 1½-in. fall to bins below, each holding 500 tons. The five bins are all arranged in a single row with six stone piers for supports. Under each 500-ton bin are nine equally-spaced 18-in. steel I-beams, embedded in the masonry supports. The wood bin structure rests on the steel I-beams, making a very satisfactory bin structure. There are two outlets for each bin, with provisions for a rinsing wash for each outlet.

Products Made

Two grades of sand are produced, bar sand and concrete sand. For the production of the bar sand the fines from the Niagara screen pass to a 60-in. Telsmith sand drag, which discharges to another 500-ton bin. For the concrete sand the fines from the jacket of the rotary screen fall to another 60-in. sand drag, and the product of this drag falls to a similar bin. The overflow from both drags runs to waste.

Until recently both sands were taken from the Niagara screen, which at that time had a ¼-in. mesh screen, and the fines fell to the first mentioned sand drag, which produced the concrete sand and the overflow



General view of the Bristol Sand and Gravel plant with log washers and sand drag in foreground

from the first drag passed to the second, where the bar sand was obtained. It was necessary to agitate the first drag, but even then the method did not prove satisfactory and was abandoned in favor of the later practice which has proven quite satisfactory.

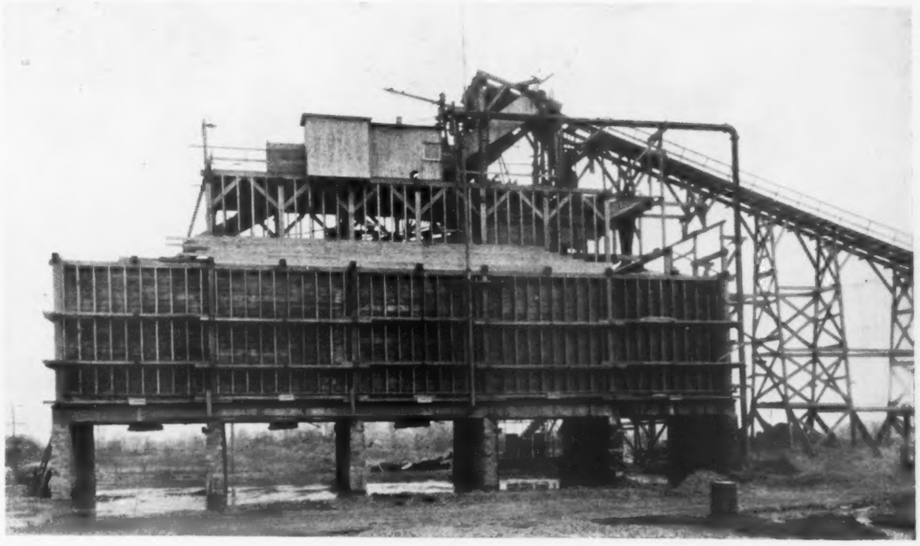
Motors Standardized

The first belt from the track grizzly (36-in.) and the rotary scalper are driven by a 40-hp. motor. The long 30-in. belt and the rotary classifying screen are likewise driven by a 40-hp. Westinghouse motor which, with the two 40's on the crushers standardizes, to a certain extent, the motors in the plant, making the stocking of several spare motors unnecessary. It might be well to here add that the motor driving the smaller crusher also drives the offbearing belt from the crushers through a series of belted counter shafts.

Excess production is trucked to five stockpiles a short distance from the plant and is reclaimed with a Byers Martins gasoline driven crane, using a 1-yd. Erie bucket, mounted on crawler treads.

The company has a Blaw-Knox batcher for proportioning aggregates, but at present does not have a central mixing plant, although one is being considered at a location that will enable it to serve both the cities of Philadelphia and Bristol.

The plant was designed co-operatively by the engineers of the company and the Smith Engineering Works. The main offices are at 709 East Chelten avenue, Philadelphia, Penn. Martin F. Connon is president; Joseph F. Nolen, vice-president; James A. Nolen, treasurer; Martin F. Connon, Jr., secretary, and James O'Toole, general manager. A total of 22 men are employed.



The five bins holding 500 tons each

Tests for Weathering Characteristics

By D. W. KESSLER
U. S. Bureau of Standards, Washington, D. C.

THE co-ordinating committee on weathering characteristics held its second meeting at the National Bureau of Standards, Washington, D. C., on April 3, 1930. The status of research on weathering in various committees of the American Society for Testing Materials was presented by members representing the committees concerned, and investigations at the Bureau of Standards on concrete aggregates, cast stone and slate were reviewed.

In the general discussion of weathering tests attention was called to various exposure conditions arising in different types of structures or in different parts of the same structure and the desirability of varying test conditions to afford information of value for the different exposures. Practical observations of value were brought to light on the better adaptability of certain masonry types to continually damp conditions such as retaining walls or the lower courses in buildings than to conditions of varying moisture conditions, while other masonry types give the opposite results. Laboratory tests were described which indicated that concrete deteriorates more rapidly in the freezing test when subjected to an occasional drying than if maintained in a wet condition throughout. It was, therefore, decided that the effects of varying moisture conditions should receive more attention in weathering tests.

Considerable evidence was presented in support of a theory that some materials decay from mineral alterations within, by an action which is independent of the usually conceived weathering agencies. Such cases seem to require only moisture and heat conditions similar to those normally present in service exposures, while the effects of frost, acid atmospheres or contamination from leaching waters may be insignificant.

This meeting of the committee was, apparently, quite successful in stimulating interest in the subject of masonry weathering and weathering tests and through the exchange of ideas, no doubt, some progress has been made towards the purpose of co-ordinating the viewpoints of committees concerned with different materials. The complexity of the subject and evident lack of of definite knowledge as brought out in various phases of research, as well as by practical observations, indicate that the subject is worthy of the best efforts of the committee.

New Series of Reports on Mining Methods and Costs

THE PUBLICATION of a new series of reports which will discuss in detail the mining and development methods employed at representative operations in the important nonmetallic mineral industries is planned by the United States Bureau of Mines, Department of Commerce. The preparation of this series of reports was decided upon because of the great interest manifested by the industry in the various reports on mining and milling methods and costs in the metal-mining field which the Bureau has been publishing.

It is planned first to accumulate general data dealing with the methods of operation at all nonmetallic mineral deposits. This information will cover the kind of material recovered and produced for market, the characteristics of the deposits, amount of overburden if any, and the method of recovery, as well as breaking, loading, haulage, and treatment methods and types of equipment used.

The next step in the proposed program will be the conducting of special studies of methods employed at certain selected operations. Officials of operating companies will be invited to assist in the program by supplying detailed technologic descriptions of their plants compiled in the form of papers following outlines prepared by the Bureau of Mines. These papers will then be published for general distribution. A study of these papers should enable operators to promote the program of increased efficiency and elimination of waste, which is the prime object of the Bureau of Mines.

The ultimate objective is accumulation of data on which to base a comprehensive research program in mining methods. This will cover such subjects as stripping surface deposits; drilling problems, and blasting methods. Methods of loading will be compared and the efficiency of various types of equipment discussed. Dredging operations and the problem of internal plant transportation will be studied.

It is also planned to study the methods of preparing nonmetallic materials for markets, including concentration methods and the crushing, grinding, screening, washing, elevating, conveying, and storage of materials.

J. R. Thoenen, mining engineer, will be in active charge of this program in the nonmetallic field.

Sand-Lime Brick Plant to Make Truck Deliveries in Philadelphia

Gray's Ferry Brick Co. Has New Plant with Several Interesting and Unusual Features

THE NEW PLANT of the Gray's Ferry Brick Co., Philadelphia, Penn., started operating, in an experimental way, on February 15 of this year, but commercial production was not attempted until about a month later, for it was the desire of the management to produce not merely a good brick but the best sand-lime brick that it was possible to produce, and to aim at uniformity of strength, good appearance and soundness from the very start.

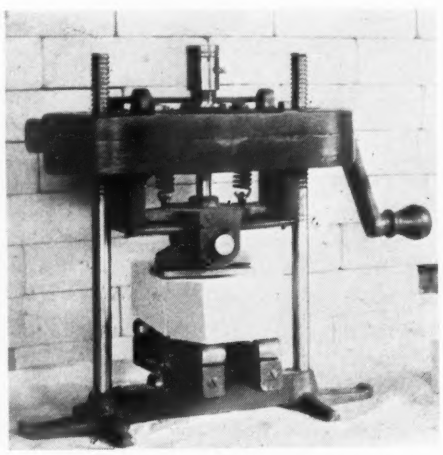
This new company is an outgrowth of the Mt. Gretna Brownstone Co., which has been a manufacturer of sand-lime brick at Mt. Gretna, Penn., for 30 years. A large part of the production of this plant was shipped a distance of 90 miles to Philadelphia for many years. The new company was formed to manufacture the product at the market and thus eliminate the cost of freight haul. The product of the new company is distributed throughout Philadelphia by truck.

The new plant is located at 51st street and Schuylkill river, and can be said to be almost in the heart of the industrial section of the city, within trucking distance of the residential district to the west of the plant, as well as the metropolitan area to the north, south and east. Water transportation is also possible, and the company receives its sand, purchased from a local sand company, at the sand company's wharf on the Schuylkill river. Rail shipments can be made direct over the rails of the Baltimore and Ohio, the Pennsylvania, and the Reading railroad systems, so if location of the plant is an indication of the further success of the venture the company should have an increasing demand for its products.

The plant engineering and construction was supervised by T. T. Lineaweaver, whose long connection with the Mt. Gretna Brownstone Co. fitted him for this task. He was aided by Louis Bollen, of the Komnick Machinery Co., Detroit, Mich., from whom some of the equipment was purchased. The limited and peculiar shape of the available plot necessitated careful planning and has resulted in a very compact plant with a capacity of 40,000 brick per 10-hour day and with the foundations placed to take the additional equipment to double the capacity.

Unusual Control Methods

The brick are subjected to a rigid laboratory control both in the process of manufacture, the character of the sand and the lime used are carefully determined before they are used and at regular and frequent intervals cured brick samples are taken from the trucks as they emerge from the curing cylinders, and after standing 12 hours, are broken on a Tinius Olsen specially designed brick-



Operation of specially designed brick breaking machine

breaking machine. These brick break at from 1050 to 1600 lb. per sq. in., the breaking strength increasing somewhat with the increase in weight of the brick. The Philadelphia building code calls for a compression strength of 2250 lb. per sq. in., and no difficulty is experienced in meeting this specification. A standard brick weighs 4.375 lb. A brick after drying in the yard has a good ring, and is of a pleasing white color.

The process of manufacture used is a refined duplicate of the system worked out at the Mt. Gretna Brownstone Co. with the Komnick system of hydration of pulverized lime in with the sand by means of a revolving drum, as an added feature. The presses used are the upright type, four-mold. There are three presses, two Chisholm-Boyd-White and one Anderson Berg. The elevators, screw conveyors, table feeders and pug mill were supplied by the Link-Belt Co. The material is ground and mixed in a 4-ft. by 10-ft. Hardinge rod mill.

The building was bought from the Maryland Metal Building Co., and is of steel construction throughout. The building and heavy equipment are supported on Simplex concrete piles driven by that company. The building is 60 by 95 ft., with a wing offset of 74 ft.

The raw materials, sand and lime, are purchased and transported to the plant. Sand is received at the company's dock on barges, unloaded by crane and placed in bin and ground storage by the Henry E. Strathman Co., Inc., of Philadelphia, from whom the sand is bought. The lime may be bought from the various producers and at present is supplied by the American Lime and Stone Co., of Bellefonte, Penn., and received at the company's siding in carloads.

The equipment is driven by electricity, 3-phase, 60-cycle, 440-volt characteristic.

A batch of brick leaving the steam cylinders

Side view of plant showing sand bunkers at extreme right and conveyor gallery to sand bin within the plant

All of the motors in the plant are General Electric and are either direct connected to the various pieces of equipment or connected through Morse silent-chain drives. The three steel bucket elevators, belt conveyor and the screw conveyors were all supplied by the Link-Belt Co. and require 5-hp. motors each.

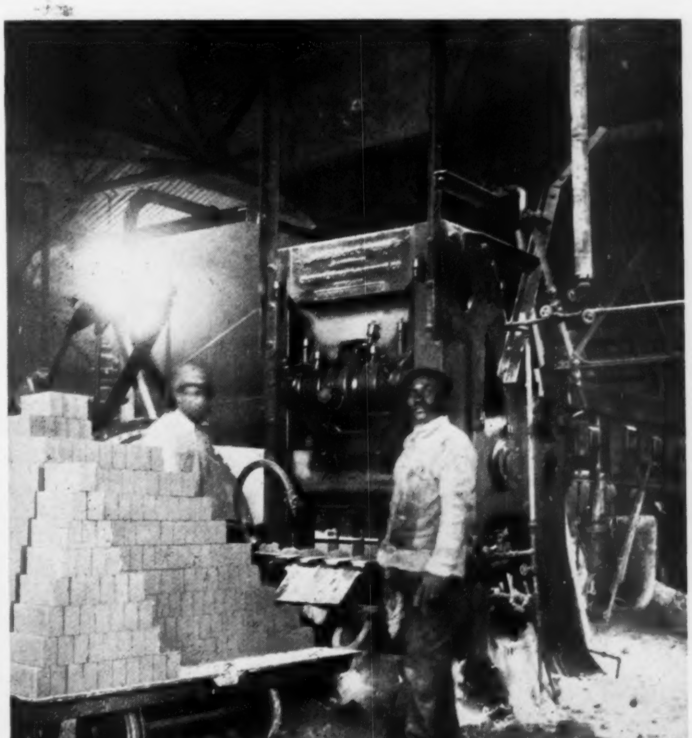
Material Handling

The sand is carried into the plant from the storage bin by a 16-in. conveyor belt, 100-ft. centers, and dropped into a measuring bin. The lime is pulverized to about 100-mesh in a Komnick ball mill and then elevated 25 ft. to a storage hopper, from which it is drawn into a Komnick weighing apparatus and the charge measured. The sand and lime measure bins feed from table feeders into a screw equipped with paddles to gain a more thorough mix which carries the batch to a 50-ft. elevator and elevates it to either of two batch storage hoppers. The batch is 5000 brick. The material is run by gravity into the Komnick hydrating drum, where sufficient water is added from a measured water tank to thoroughly hydrate the lime. The batch is rolled sufficient time to mix and hydrate, about 35 minutes.

The batch is then emptied from the drum by gravity into a storage bin which holds

Front view of one of the presses

material for 20,000 brick. From this hopper the material is fed by a table feeder at a



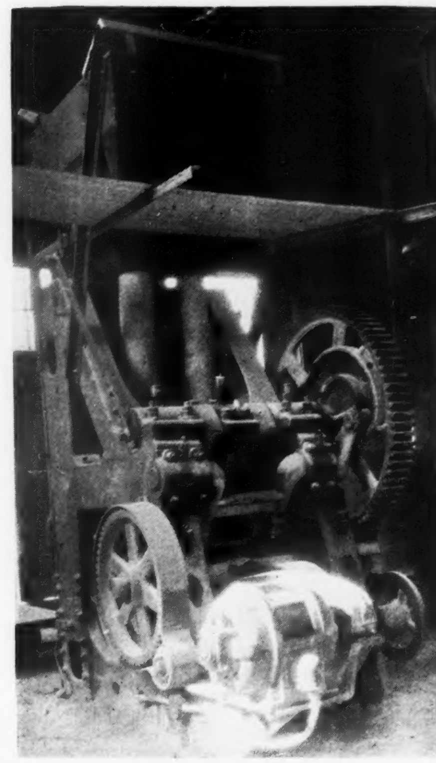
One of the three brick presses

Lime weighing hopper at left and sand measure hopper

Drive end of the hydrator and mixer

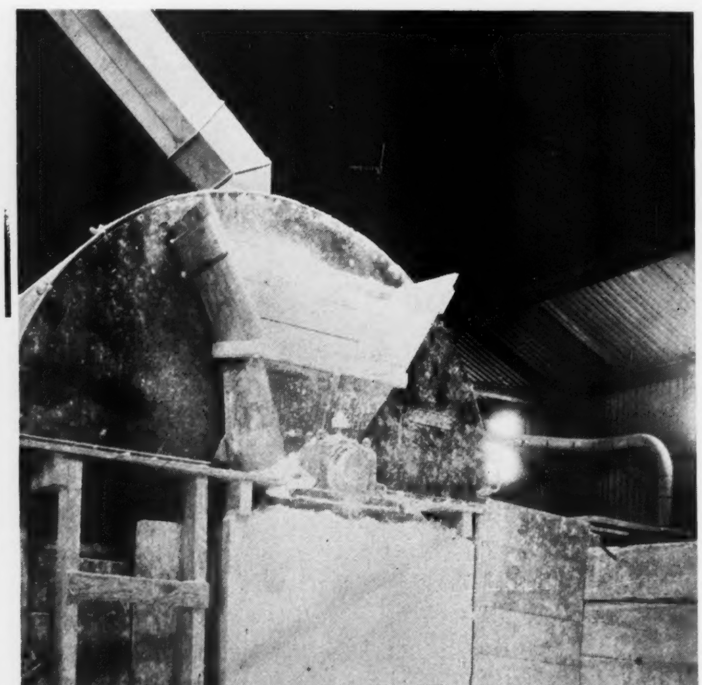
measured rate into a rod mill. The rod mill grinds and again mixes the material and discharges into a pug mill in which the material is properly tempered to the proper proportion of moisture for the pressing. From the pug mill the material is carried to the press elevator, elevated and fed to the small bins over the presses, and from there into the presses by gravity. From the presses the brick are set upon the brick cars, 1000 on each car, and then placed in the cylinders to be hardened. The brick are hardened under a steam pressure of 100 lb. for 10 hours. After that the brick are ready to be shipped or stored in the yard.

The process of making sand-lime brick is a chemical one, and every care was taken when the plant was laid out to get accurate measuring and careful handling of the materials. The sand is tested, both chemically and physically. Frequently analyses are made for silica content, and screen tests to determine grading. Upon the proper grading of quality of sand depends the quality of the finished product. To insure proper grading at all times, regardless of variation at the source, the Hardinge rod mill was installed. The lime used is a high calcium lime, burnt in a very modern plant under careful supervision. A pebble size lime is

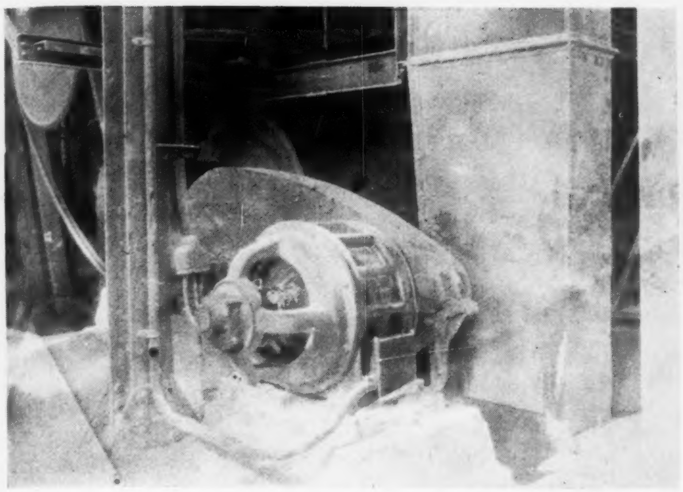


Rear view of press showing drive through silent chain

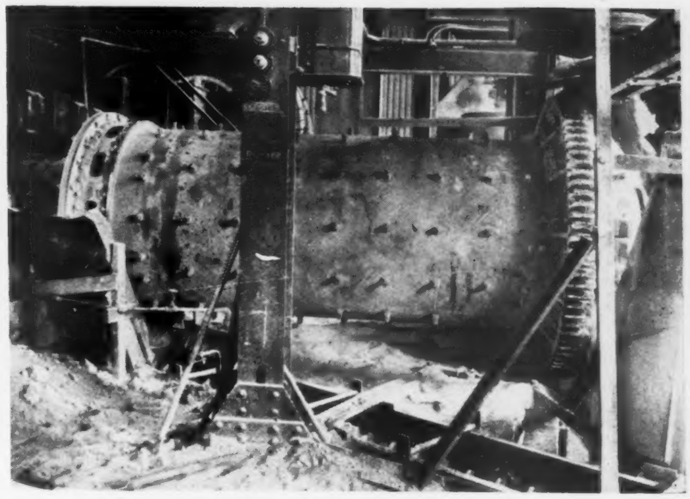
Lime weighing hopper. Disk feeder below discharges into a screw conveyor



Ball mill for preparing lime before mixing with sand



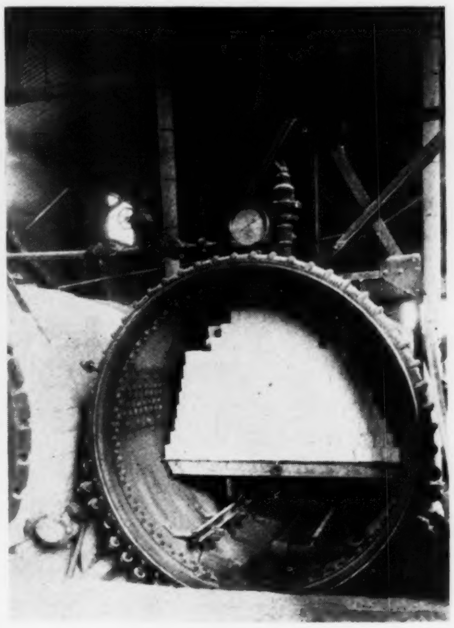
Electric driven rod mill through silent chain drive



The rod mill used for partial grinding of sand and lime after hydration

used to help to prevent air-slaking in transit, and because this size is more thoroughly burned. The materials are carefully measured, well mixed and properly handled. The water introduced to the hydration drum is measured to the pound to insure the addition of the proper quantity and prevent insufficient hydration and thus avoid the danger of burning the mix.

At the presses a very careful watch is kept. Brick are weighed every hour, for



Cured bricks in the cylinder

upon density or weight of the brick depend strength and the percentage of absorption. The presses are equipped with a little agitating device, made by the plant foreman, to insure the proper filling of the mold boxes and thus a uniform product by weight.

The resulting product is a very good sand-lime brick. Each day from 5 to 15 brick are first weighed and then broken. This machine registers the breaking load of the brick and this figure is then translated into the modulus of rupture. From the modulus of rupture using the table showing the relation of this figure, to the compression strength of the brick plant as published in ROCK PRODUCTS, November 23, 1929, and given as the result of the experiments of the U. S. Bureau of Standards, the compression strength figure is obtained.

The brick are average well over 625 lb. modulus and therefore a crushing strength of about 3600 lb. per sq. in. The absorption using the 24-hour submersion test in water runs about 12%.

The main offices of the company are at Lebanon, Penn. T. H. Lineweaver is president and general manager. L. Fellenbaum, an experienced sand-lime brick man, is plant superintendent.

Louis Bollen, representing the Komnick Co., continues to work with the Gray's Ferry Brick Co.

Medusa Cement Reported to Be Prospecting in Virginia

AN OPTION has been recorded at Luray, Va., in the clerk's office, taken by the Medusa Portland Cement Co., of Cleveland, Ohio, on about 20,000 acres of land belonging to the Allegheny Ore and Iron Co. in the southern part of Page county, and it is reported that a force of about 25 men is prospecting the property. It is further reported that large chalk banks have been found near the Fox mountain about six miles from Shenandoah. The consideration named in the option is $35,000 and the prospecting price named is $1,000. The option which covers all mineral rights expires May 1. The work is in charge of Robert F. Watson of Naked Creek.

On these lands is the site of the old Gem Furnace which was in operation more than a generation ago, and also the Boyer and the Kimball mines which were then being worked. A railroad line extended up the Naked Creek which, without very great cost can be restored, it is said.—*Roanoke* (Va.) *Times.*

Oregon Diatomaceous Earth Operation Enlarging

THE ATOMITE CORP.'S plant on the Deschutes river near Terrebonne, Ore., is undergoing reconstruction and will be completed by May 15, according to J. W. Ganong, who is in the company.

This plant, which turns out several products of diatomaceous earth, was destroyed by fire February 26, and now its capacity will be doubled under the reconstruction program. Its new capacity will be 50 tons of material in eight hours. The latest modern equipment will result in a better grade of product for marketing. Electric power instead of gasoline will be used in operation. A Bates valve-bag packer is included in the new equipment and also a calcining plant.

The products of this plant will be used for filtration purposes, for insulation and for an admixture in cement for concrete.

Some time ago the Atomite Corp. leased the property of the Diatomite Co., of which Mr. Ganong was president. Officers of the Atomite Corp. are: President, A. H. Krieger; vice-president, O. S. Smith; treasurer, James Cole and secretary, John Pipes.

Effect of Coarse Aggregates on Quality of Concrete

A NEW BULLETIN, No. 5, entitled "Effect of Characteristics of Coarse Aggregates on the Quality of Concrete," has just been issued by the National Sand and Gravel Association, Washington, D. C.

The bulletin is the fifth of a series to be prepared by the engineering and research division of the association, and is a discussion of the effect of coarse aggregate characteristics on the quality of concrete in the light of present knowledge as developed by laboratory and field investigations. Some of the indefinite requirements generally included in specifications are outlined.

Analyses of Waste Gases of Rotary Cement Kiln and Their Part in Kiln Control

By Alton J. Blank

General Superintendent and Supervising Chemist, Compania de Cemento Portland "Landa," S. A., Puebla, Puebla, Mexico

CONSIDERABLE has been written on the subject of kiln control through the use of the Orsat gas apparatus but, to the writer's knowledge, little has been said of mechanical gas recording devices and their possibilities in this connection.

A number of years ago the writer was connected with a cement works where there was in operation in connection with each of the kilns a continuous carbon dioxide and oxygen recording apparatus known as the "Arkon" recorder. This instrument was of the water driven type and was situated in an enclosure situated some 50 ft. from the feed end of the kilns, at which point samples of the waste-kiln gases were taken continuously through the medium of a special alloy pipe which projected several feet beyond the feed ring into the kiln. The "Arkon" apparatus (one being used on each kiln) may be so regulated as to analyze anywhere from five to ten samples of the waste gases hourly. Attached to the "Arkon" sampler are carbon dioxide and oxygen charts upon which the results of each gas analysis are recorded automatically. These charts are graduated into 24 divisions, each division representing an hour; the carbon dioxide chart is graduated up to 30% and the oxygen chart is graduated up to 10%. The same absorbents are used in the "Arkon" apparatus as in the "Orsat" machine.

New solutions are made up after a certain number of analyses have been made and where approximately ten analyses are made hourly it is customary to change the solutions once each week.

Hourly checks on the "Arkon" apparatus analyses through means of the Orsat machine have shown that there is seldom a variation of more than 0.1% to 0.2% of carbon dioxide between the two machines. However, checks show that the oxygen contents as recorded by the "Arkon" apparatus are usually erroneous. Months of experimenting show that the "Arkon" apparatus can be depended on in so far as the carbon dioxide recorder is concerned.

There are a number of factors which may cause a variation in the carbon dioxide record as shown on the "Arkon" chart, and these may be stated in part as follows:

1. Variation in amount of fuel being burned.
2. Variation in the calcium and magnesium carbonate contents of the raw materials being fed the kiln.
3. Variation in the amount of raw material being fed the kiln.
4. Variation in the kiln draught.
5. Variation in the moisture content of the raw mixture.
6. Variation in moisture content of fuel.
7. Poor atomization of the fuel.
8. Allowing the kiln to become cool.
9. Irregularity of flow of water through the "Arkon" apparatus.

It has been found that when a sheet of silver foil is placed directly under the discharge water pipe of the "Arkon" apparatus this foil will turn a brownish-black color whenever there is carbon monoxide present in the waste-kiln gases. It is therefore customary for the kiln operators to glance at the silver-foil as well as at the "Arkon" charts before making a change in the kiln operation. By this means it is possible for the kiln operator to regulate the kiln draft, the amount of oil to be burned, together with other factors of the kiln operation by paying as close attention to the "Arkon" apparatus as he does to the kiln operation through his kiln glasses. However, it is not meant to convey the impression that the kiln could be operated by means of the "Arkon" indications alone.

For the purpose of acquainting the kiln-operators further with the importance of the "Arkon" apparatus, in showing them the amount of oil being burned per ton of clinker output, calculations were made (with known analyses of fuel oil, raw materials and taking other factors into consideration) of the waste-gas analyses and figures compiled to show the number of gallons of fuel oil being burned per metric ton of clinker when (1) neutral atmosphere was had, (2) and when 0.5, 1.0, 1.5 and 2.0% of oxygen was present in the waste-kiln gases.

Compilation of the calculations follows:

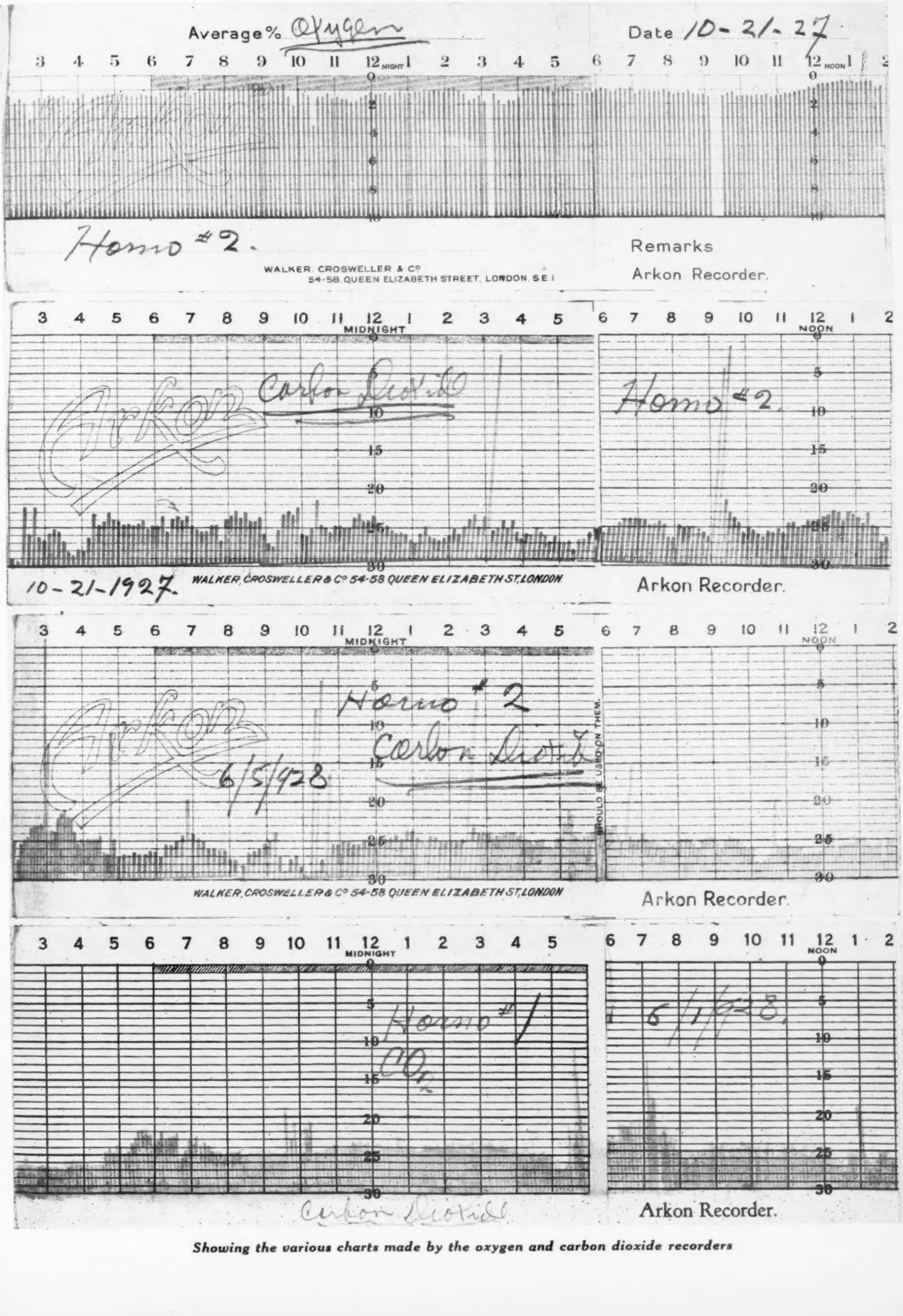
TABLE OF AMOUNT OF FUEL OIL BEING BURNED WHEN NEUTRAL ATMOSPHERE IS HAD, AND WHEN OXYGEN IS PRESENT IN EXCESS IN THE WASTE KILN GASES

Gallons oil being burned per metric ton clinker output	Neutral atmos., %	Excess oxygen in kiln gases 0.5%	1.0%	1.5%	2.0%
46	27.26	26.60	25.95	25.30	24.64 CO_2
48	26.84	26.20	25.55	24.91	24.26 CO_2
50	26.47	25.83	25.20	24.56	23.92 CO_2
52	26.11	25.50	24.89	24.28	23.67 CO_2
54	25.77	25.19	24.61	24.02	23.44 CO_2
56	25.45	24.90	24.34	23.78	23.22 CO_2
58	25.15	24.62	24.09	23.55	23.01 CO_2
60	24.88	24.37	23.85	23.33	22.81 CO_2
62	24.61	24.12	23.63	23.13	22.62 CO_2
64	24.36	23.89	23.42	22.93	22.45 CO_2
66	24.13	23.66	23.19	22.73	22.25 CO_2
68	23.91	23.44	22.98	22.51	22.05 CO_2
70	23.69	23.23	22.77	22.31	21.85 CO_2
72	23.46	23.01	22.55	22.09	21.64 CO_2
74	23.29	22.84	22.39	21.94	21.49 CO_2
76	23.12	22.67	22.22	21.77	21.32 CO_2
78	22.95	22.50	22.05	21.60	21.15 CO_2
80	22.78	22.33	21.88	21.43	20.98 CO_2O

The above calculations were made, of course, on the assumption that the calcium and magnesium oxide contents of the clinker were 64.5 and 2.0% respectively, and inasmuch as the average clinker composition month in and month out approximated the percentages shown it was to be assumed that the tables could be more or less relied upon, this in view of the fact that analyses of the fuel oil showed its composition to be more or less the same from month to month.

However, the average analyses of the waste-kiln gases as determined by both Arkon and Orsat machines, when checked against the average calcium and magnesium oxide contents of the clinker, and these in turn checked against the actual number of gallons of fuel oil burned in the kilns, has shown that this method of computing the fuel consumption from the waste gas analyses is more or less in agreement.

According to the calculations of Dr. Geoffrey Martin in his article, "The Theory of the Rotary Cement Kiln," the percentage of fuel lost when carbon monoxide is present in the waste kiln gases is 5.84 times the volume percentage of carbon monoxide.



Showing the various charts made by the oxygen and carbon dioxide recorders

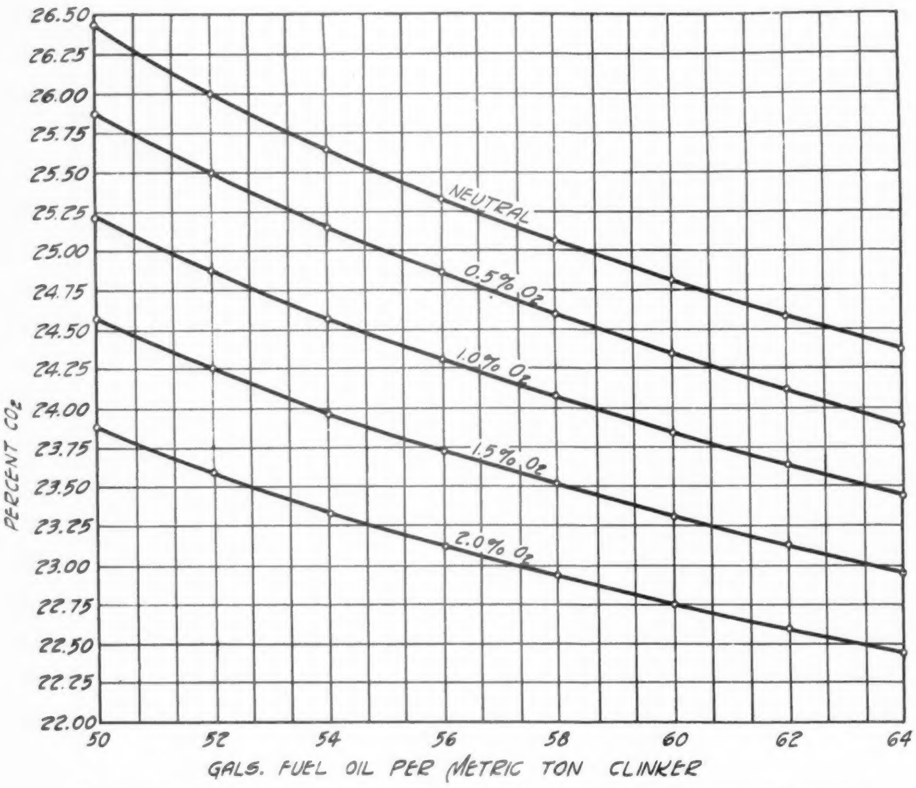


Chart showing the fuel consumption in gallons of fuel oil per metric ton of clinker burned

Assuming these calculations to be correct, the loss in fuel had with the following percentages of carbon monoxide present in the waste kiln gases would be as follows:

% of carbon monoxide in waste-kiln gases	% of fuel loss
1.0	5.84
2.0	11.68
3.0	17.52
4.0	23.36
5.0	29.20

In the same article referred to above, Dr. Martin states that the least loss in fuel is had when 1.1 and 1.2% of oxygen is present in the waste kiln gases, and goes on to state that the percentage of fuel lost in heating up excess air depends upon the temperature of the waste kiln gases as discharged from the kiln and may be calculated by the following formula:

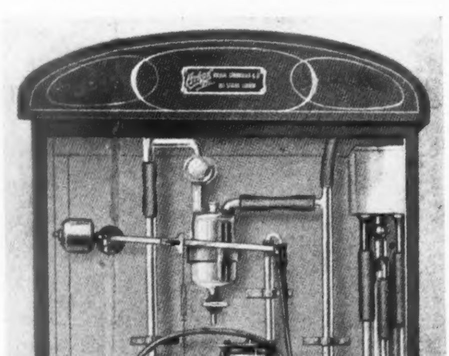
$$\text{Loss at back-end temperature (T) equals } \frac{\text{T minus 60}}{\text{760 minus 60}} \times \text{loss at 760 deg. F.}$$

According to this formula, if the exit gas temperature was 1400 deg. F., with varying percentages of oxygen present in the kiln gases, the fuel loss would be as follows:

% of oxygen in waste kiln gases	% of fuel loss
1.0	1.32
2.0	2.84
3.0	4.60
4.0	6.66
5.0	9.10

These figures show quite markedly the loss that may be had in fuel when insufficient and excess oxygen is had in the waste kiln gases, and were these advantages of regular kiln control through the means of gas analyses exercised in cement works as a whole, at least one important step would be taken towards fuel conservation in the cement industry.

It seems altogether possible that in the years to come practically all rotary cement kilns will be operated in connection with one or other type of carbon dioxide, oxygen and carbon monoxide recorders.



This is the recorder for analyzing waste kiln gases mentioned in Mr. Blank's article

Cement Journal Published in Four Languages

RECOGNIZING the international aspects of the cement industry, the English publication *Cement and Cement Manufacture* has recently inaugurated the practice of publishing its monthly journal in four languages—English, French, German and Spanish. In this way cement research and developments, regardless of the country of origin, are more easily available to interested parties who have hitherto been somewhat handicapped in knowing only their native language.

The first issue, that of January, 1930, contains a number of interesting articles, both technical and pertaining to plant design. There are, for example, several fine articles on the testing and properties of cements, the work of foreign investigators well known to American cement men. Descriptions of new mills recently erected in Europe and Japan are featured in another set of articles.

By way of criticism, it seems that American plants and research men have been neglected—at least for this first issue. We know that there have been erected within the last year cement mills in the United States which for essentials of design and equipment are outstanding. Again, it would seem that there should have been an article on the use of slurry filters; in view of the fuel economies derived from their use, such articles would appear to be of particular interest to almost all European cement manufacturers. We might also point out that the efforts of such men as Bogue, Hansen and Pike, to mention only a few American investigators, would command attention at any and all times.

The publishers of the journal are to be felicitated for their effort and it is almost certain that the journal will be welcomely received. We are looking forward to seeing other issues.

Price of Cement Lowered in British Columbia

A REDUCTION in the price of cement by the British Columbia Cement Co., which operates an exceptionally modern plant at Bamberton, B. C., is announced through Evans, Coleman and Evans. The reduction cuts the price of cement 7½%, the sale price being dropped 20 cents a barrel, effective April 1.

In making the announcement the British Columbia Cement Co. states that the reduction is planned to stimulate building throughout the province and is another step towards cheaper output and lower cost of building materials.

The company operates the only cement making plant in British Columbia and spends $1,250,000 annually in British Columbia.

Further reductions are foreshadowed by the company as production costs of the material are lowered.—*Vancouver* (B. C.) *Evening Sun.*

Soil Reaction and pH Values*

Theory and Practice in the Application of Hydrogen Ion Concentration to Soils

By Ove F. Jensen

Assistant Director, Soil Improvement Work, The National Fertilizer Association, Chicago, Ill.

STUDIES on soil reaction, and the causes of soil acidity, are claiming much attention in scientific literature. The complexities of the base-exchange reactions in soils are probably only beginning to be understood, but enough is known to explain many of the phenomena associated with soil reaction. The application of hydrogen ion concentration determinations to soils has given a tremendous impetus to research along soil acidity lines. Most scientists believe that the intensity of soil acidity as measured by the hydrogen ion concentration is a better measure of soil acidity than the quantity of acidity as determined by chemical methods. Certainly acidity is expressed more accurately by hydrogen ion concentration than by any other method.

Why Acidity Develops

All authorities agree that soil acidity is produced by weathering of a soil. Acid soils are found only in regions of relatively high rainfall, where drainage exceeds the evaporation in a soil. Drainage, then, is the principal agent in creating soil acidity, and the greater the rainfall, the more acid are the soils likely to become. Chemical analyses of drainage waters show the removal in solution of considerable quantities of bases—largely calcium, magnesium and sodium, with some potassium. As these bases are removed, hydrated silicates of iron, aluminum and silicon are left in the soil. Hydrated silicates have an acid reaction, the intensity of which depends on the completeness of the removal of bases. Not only is the acid reaction detrimental to the growth of some plants, but toxic effect may be produced, for example, by the hydrated aluminum silicates. A further effect of base removal and consequent acidity is that calcium is so firmly combined with the alumino-silicates that it is unavailable for plant use. Plant growth is then limited not so much by acidity as by lack of calcium. Satisfactory conditions may frequently be restored by applications of liming materials, although the acidity is not completely neutralized. Even in the form of calcium silicates, the plant need for calcium may be satisfied.

It was once held that organic acids were the principal cause of soil acidity. Organic acids as a source of acidity are common in muck and peat soils, but apparently do not play a large role in the acidity of mineral soils. Theoretically, the addition of organic matter to a soil should produce organic acids and increasing acidity. Practically, however, it has been found that additions of organic matter, such as manure, crop residues, or legume crops plowed under, frequently decrease the acidity of soils.

Without reviewing all of the theories that have been held concerning soil acidity, it may be said that the removal of bases is the fundamental cause of acidity in a mineral soil.

> ### *Editors' Note*
>
> ***NOBODY who produces and sells agricultural lime or limestone can hope to escape much longer from an acquaintance with "pH values." We confess the subject has been more or less puzzling to ourselves, even though occasionally we have published articles in which pH's were discussed.***
>
> ***The article herewith clears up all previous haziness. It is written so that anyone with only a little knowledge of chemistry—mostly a knowledge of what a few chemical symbols mean—may understand it.***
>
> ***We heartily recommend a careful reading of this article by all who would keep pace with developments in agricultural or soil chemistry—and certainly everyone who produces or sells agricultural liming materials is included in this classification.—The Editors.***

Tests for Soil Acidity

Previous to the measurement of hydrogen ion concentration, it was not possible to define accurately acidity between very narrow limits. The litmus paper test, for many years a standby in testing soils, allows too great an error because its range is so wide, and there is some difficulty in obtaining sensitive paper. There are a number of tests in which neutral or basic salts are used to measure the base exchange or amount of bases necessary to render the soil neutral or alkaline. In the hands of careful operators, some of these tests are quite satisfactory, but in general they are more or less inaccurate. The results are usually given in amount of lime materials necessary to bring the soil to a neutral reaction.

The Comber test, employing a solution of potassium thiocyanate, is another qualitative test that in the field has proven of considerable value.

In the most recent test of soil acidity, the intensity of acidity as measured by pH value is used. While the pH value does not always accurately indicate lime requirement or the degree of response that can be expected from liming, it is a good measure of the injurious effects of acidity, and it has come to be widely accepted as a method for expressing acidity in more definite terms than are possible in lime requirement tests. To explain pH value, and its application to soils, it will be necessary to discuss hydrogen ion concentration in a general way, to make clear the meaning of the terms used.

What Is an Ion?

An ion may be described as an electrically charged body in a water solution. All water solutions contain these electrically charged bodies in variable amounts. Water, H_2O, contains free H and OH ions. Hydrochloric acid, HCl, contains H and Cl ions. Sodium nitrate, $NaNO_3$, contains Na and NO_3 ions. It may be difficult to conceive how ions of some of the elements can be free, in view of properties of the elements which make many of them unable to exist in contact with water. The theory is that the ions of these elements are quite different from the elements themselves because of their electrical charges. When these charges are removed, as by electrolysis, the ions disappear, and the elements of which they are composed take their usual properties. Thus in a solution of sodium chloride, NaCl, the Na ions do not possess any of the properties of sodium, nor do the Cl ions possess any of the properties of chlorine. When, however, an electric current is passed through a solution of sodium chloride, the Na ions are freed from their charge, and metallic sodium is set free at one pole, which at once reacts with water giving free hydrogen and sodium hydrooxide, while the Cl ions lose their charge and are set free at the other pole as chlorine gas.

When a salt, acid or base is dissolved in water, some molecules of the substances remain as such, but decomposition into ions begins immediately until a certain fixed ratio is reached between the undecomposed substance and the product of the number of ions itself. Even water itself dissociates into H and OH ions, but to a very small extent. A liter of water weighing 1000 grams contains 0.0000001 gram of H ions, and an equal weight of OH ions. The degree of dissocia-

*Reprinted from the *American Fertilizer*.

tion or ionization of various substances in water varies widely. For example, a tenth normal solution of hydrochloric acid (containing one-tenth gram of ionizable hydrogen per liter) has 91% of its hydrogen in the ion form. A tenth normal solution of acetic acid, on the other hand, is ionized only to the extent of 1.3%.

The pH Value

In any solution, the concentration or intensity of the hydrogen ions may be measured and stated in a term known as the pH value. Pure distilled water, as has already been stated, is dissociated into H and OH ions to a very slight degree. The product of the H and OH ions equals a constant. By electrical conductivity measurements, this constant for pure water has been found to be 1/100,000,000,000,000. Since the number of H ions in pure water is equal to the OH ions, each has a concentration of 1/10,000,000, which may be expressed mathematically as 10^{-7}. Sorenson, a Danish scientist, working in 1909, suggested that a more convenient way to express hydrogen ion concentration would be to use the logarithm of the reciprocal, and called this figure the pH value, H referring to hydrogen, and p to the potential or intensity factor. Thus the pH of pure water, which is neutral, and containing 1/10,000,000 gram hydrogen ions per liter, is the logarithm of 10,000,000, which is 7.0. An acid solution is said to be normal with respect to the hydrogen ions when it contains one gram of ionized hydrogen per liter. Since the reciprocal of the hydrogen ion concentration expressed in grams per liter is also the normality of the solution, the pH value can also be defined as the logarithm of the denominator expressing the normality of H ions.

If a small amount of acid is added to pure water which has a pH value of 7.0, the total number of H ions in solution will be greater than 1/10,000,000, and the solution will be acid. Assuming that the hydrogen ion concentration is found to be 1/1,000,000, this gives a pH value of 6.0. It is readily seen that a solution having a pH value of 6.0 contains ten times as many hydrogen ions as a solution of pH 7.0, and similarly, a solution with a pH value of 5.0 contains 100 times as many hydrogen ions as a pH 7.0 solution.

An alkaline solution contains a smaller number of H ions than does pure water. As the concentration of OH ions increases, the concentration of H ions decreases, because the product of the two equals a constant. Even in strongly alkaline solutions, there are always some H ions, and so it is convenient to express both acidity and alkalinity by pH value. Values higher than 7.0 denote alkalinity, the degree of alkalinity increasing as the numbers increase. A solution in which the hydrogen ion concentration is reduced to 1/100,000,000 has a pH value of 8.0, and contains one-tenth as many H ions as pure water, and conversely, it contains ten times as many OH ions.

The relationship between acidity and alkalinity and pH values of a few common acids and bases may be made more clear by the values below, which are given for tenth normal solutions:

HCl	1.0
H_3PO_4	1.5
H_2CO_3	3.8
$NaHCO_3$	8.4
Na_2CO_3	11.6
$NaOH$	13.1

The Measurement of pH Value

How do we know that a liter of pure water contains 1/10,000,000 gram of ionized hydrogen? It is not necessary to give the method for this determination in full, except to state that the measure is made by a hydrogen electrode, utilizing sensitive galvanometers to measure differences of potential. Practically, it has been found that certain chemical indicators are very effective in determining hydrogen ion concentration by their change of color; and most measurements of pH value used in various sciences and industries are made today with those indicators, which give results that agree very well with the hydrogen electrode method. There are several tests for soils employing sensitive chemical indicators, such as brom thymol blue, which determine with fair accuracy the pH values of soils.

The pH Value of Soils

The pH values of humid soils range from 3.4 to 8.0. Bearing in mind that 7.0 is neutral, any value above this figure is alkaline, and below 7.0 is acid. Fairly definite ranges of pH values within which certain plants are at their optimum have been worked out. Correlations have also been shown between the actual distribution of plants and the pH values of the soils in which they are found. Many species of plants will grow best only on soils within a certain range of pH value. Well defined soil types have been found to have characteristic pH values. Certain diseases, such as potato scab, are most destructive at a certain hydrogen ion concentration.

Barnes of Ohio has set down the following list of crops and the pH values below which their culture should not be attempted, which illustrates the relative tolerance of crops for soil acidity.

pH Value Below Which Growth of the Following Crops Should Not Be Attempted

pH Value	Crops
6.5	Alfalfa Sweet clover
6.0	Cabbage Cauliflower Lettuce Spinach Barley Sugar beets
5.5	Red clover Corn Wheat Cantaloups Timothy Canada field peas Kentucky bluegrass
5.0	Oats Soy beans Cowpeas Potatoes Tobacco Red top Canada bluegrass Alsike clover Mammoth clover
4.5	Strawberries Watermelons Buckwheat Rye

pH Value and Time Requirement

As has been already stated, the pH value is not a wholly accurate measure of lime requirement. The "buffer capacity" of a soil, or the capacity of the soil to resist changes in acidity as measured by the hydrogen ion concentration, must be considered. Some soils have been found to undergo very little changes in pH value from lime applications, while others have been radically changed by the same applications. The cause of these differences in reaction has been attributed to organic matter, and colloidal material. The reactions involved are not fully understood. "Buffer capacity" can be determined chemically, and is a helpful guide in determining lime requirement.

Spurway of Michigan gives a table of lime requirements for soils of various pH values as follows:

pH Range	Tons Limestone per Acre
7.0 up	none
6.8-7.0	none
6.2-6.7	0-1.5
5.7-6.1	1.5-2
5.0-5.6	2-2.5
4.9 and below	2.5-3

The Correction of Soil Acidity

In many cases it is unnecessary and unprofitable to completely satisfy the lime requirement of a soil. Some crops tolerate and do best on a soil of moderate acidity. The influence of acidity on plants is extremely variable. Lack of calcium or some other plant-food element is frequently the limiting factor rather than soil acidity. Fertilizer is not a substitute for lime, nor is lime a substitute for fertilizer. The best results from fertilizer will be secured when the soil reaction is right for the crop. The correction of soil acidity, then, requires the exercise of a considerable judgment, which should take into account the crop as well as the soil reaction.

Refractory Manufacturer Adds Cement and Lime Division

THE Laclede-Christy Clay Products Co., St. Louis, Mo., has announced a "cement and lime industry division" which will be directed by Sales Engineer J. A. Kayser. Mr. Kayser is very familiar with the manufacture of refractories and he has made a special study of conditions in the cement and lime industries.

Power Factor and the Northern Ohio White Lime District

How the Power Factor of a Whole Industry Has Been Improved

By W. V. Gorton
Industrial Division, Toledo, Ohio, Office, Westinghouse Electric and Manufacturing Co.

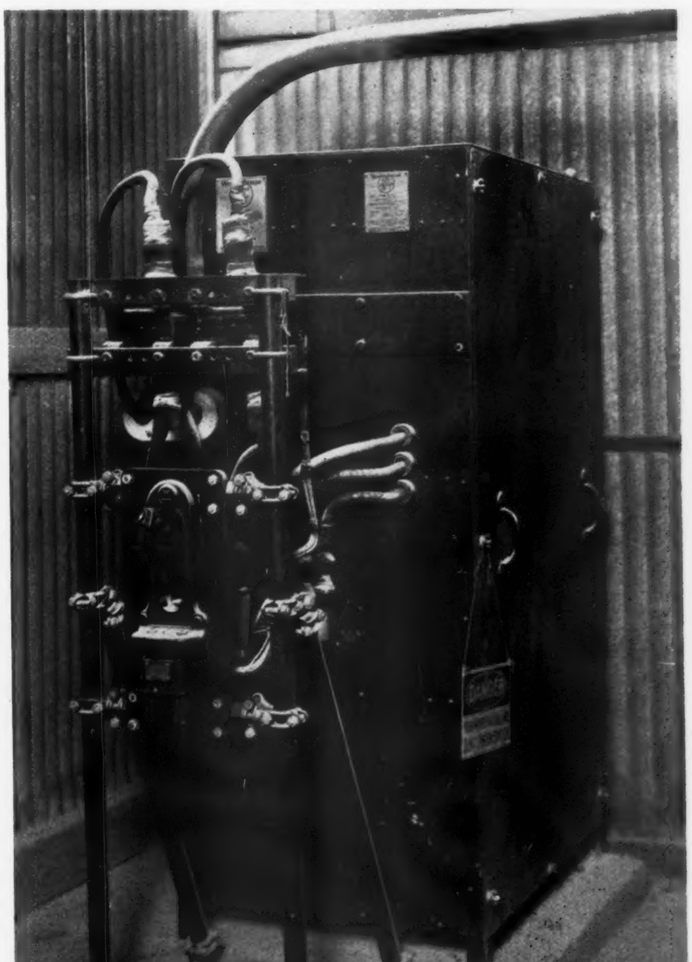
THE issue of ROCK PRODUCTS, April 12, 1930, contained an elementary discussion of the power factor in rock products plants and what a low power factor means in plant operation and electric-power costs. In this article I am able to give a specific example of the application of modern scientific knowledge to an entire industry—the finishing lime industry of northern Ohio, where competition is keen, not only between producers there, but between the producers of this district and lime producers everywhere else in the United States.

The introduction of electric power into this industry has wrought great changes, as it has in all others. For the lime industry of this section is an old one and has developed gradually from man- and horse-power operations to strictly modern ones in every sense of the word. With the general processes involved in the quarrying of the rock, the crushing of rock, burning it to lime, hydrating the lime and sacking it for shipment, every reader of ROCK PRODUCTS is familiar.

All of these processes required the development of apparatus capable of utilizing electric power and of eliminating, in so far as possible, the human element. In this, electrical apparatus manufacturers worked with stone-handling apparatus builders and gradually worked out the means. Motors large and small were coupled to machines and made to perform the tasks that had cost so much in sweat and toil and lives of workmen.

Machinery of this kind, having hard rough work to do is necessarily made heavy and strong. Great masses of iron and steel must be set in motion and then kept moving as the raw material is picked up, transported, crushed, graded or sacked. Large motors are needed to start the machinery, but unfortunately for best electrical conditions, large motors when doing the comparatively light work of maintaining motion, have a notoriously low power factor. For instance, many plants use jaw crushers for the first job of breaking up the rock after reaching the plant from the quarry. A 350-hp. motor is taxed severely in cold weather getting the huge iron and steel jaws supported on their grease-stiffened bearings into motion, or in starting up after stopping with a hopper full of stone. Once in operation, however, the load on this motor is well under 100 hp. The power factor under such conditions is pretty apt to average about 40%. Other motors around the plant may fare better than this, but in general power factors averaged between 45 and 65% in this district.

Power companies came to realize in time that they were being forced to use about double the generating, transforming and transmission line capacity that they could collect on from their customers under their old tariffs. They knew that for every kilowatt of energy they sold they had to buy equipment sufficient to transmit 2 or 3 kilowatts and decided to charge for power on a schedule involving penalties for low power factors and bonuses for high ones. These went into effect early in the year 1928.



Dust-tight 150-KVA. capacitor with its oil circuit-breaker mounted separately

The quarry owners, having been forewarned of this step some time in advance, immediately proceeded to install power factor corrective apparatus. Engineers had already made preliminary surveys of the operating conditions so that when the time came for action everyone knew approximately the type and amount of corrective equipment needed to eliminate the penalties and to take advantage of bonuses where it was economical to do so. Most of the plants had all of their machinery operating to their satisfaction from a mechanical standpoint, therefore it was found advantageous in those cases to install capacitors at various points throughout the plants to secure the maximum of correction at a minimum of expense. Other plants, where motor changes could advantageously be made, used a combination of synchronous motors to replace old or worn out induction motors and capacitors to supply additional corrective KVA.

In determining the most advantageous method of correction the problem had to be approached from a number of different angles. In the first

Handling stone in the quarries of the Woodville Lime Products Co., Woodville, Ohio

place, the ideal place to correct power factor is as near as possible to the apparatus causing the low power factor. In this way the excess current causing what is known as wattless energy is eliminated at the source and from there back to the power company's power house. On the other hand, putting correction on each individual motor involves the purchase of considerably more corrective equipment than would be required if group correction could be used. This is where the corrective equipment is all assembled at one or two places and advantage taken of the fact that all motors are not operating all of the time, in other words, of a diversity factor. Another angle requiring consideration is the difference between day and night operation and between seasonal production changes. Still another point concerns the amount of voltage drop due to the wattless energy flowing in a line from the quarry owner's transformer bank out to some particularly heavy load. Where this drop in voltage is excessive, it occasionally is necessary to swing away from the group advantages back toward the individual motor correction.

As capacitor equipments are unable to do any mechanical work, their only excuse for installation is the amount of money they can save the owner on his power bills. Synchronous motors also costing more than induction type motors, justification for their extra cost goes back to this same reason. The savings to be derived, therefore, are calculated as the difference between what the power will cost with the previous low power factor and the power cost with corrective equipment installed. This saving when compared with the investments has proven astonishingly high. The average calculations on a 440-volt, 3-phase, 60-cycle distribution system show that the cost of corrective equipment, properly applied, yields a return running from 75 to 100% or more annually. This is a tangible and definite saving. Other advantages, such as increased voltage due to the reduction in feeder line voltage drops, better service from the power companies due to reduction in heating losses through the transformers and transmission lines, and the fact that in some cases new synchronous motors were put in where an old outworn motor had been, were of course unable to be given a definite value. These might be called incidental advantages.

An Illuminating Example

We will take the conditions found in one plant and show the means by which correction was obtained, as a typical example. The plant in question had operated for some years using from 100,000 to 125,000 kilowatt-hours per month. The voltage varied with load fluctuations from 330 to 550 volts due to an outgrown power distribution system, and the power factor was generally between 60 and 65%. A check-up of motors indicated that quite a number were normally less than one-third loaded, but that in only three or four instances could smaller motors be substituted, thereby eliminating some of the causes of the low power factor.

The power company's rate schedule is based on a sliding scale and is such that for the amount of energy consumed by this plant the cost per kilowatt-hour was $0.019. This is increased or decreased according to the power factor as it averages below or above 80%. As the bonus does not increase much for power factors of over 95% while corrective equipment required for each per cent in that range increases rapidly, an economical point to correct to has been found to be 95%. The problem was to determine the best means of obtaining this correction.

First it was necessary to determine the number of corrective kilovolt-ampere hours needed per month, having assumed that the average monthly power consumption was 121,000 KWH. at 60% power factor.

From this it was known that whatever

121,000 KWH. at 60% P.F. = 201,666 KVAH. = 161,332 Reactive KVAH.
121,000 KWH. at 95% P.F. = 127,400 KVAH. = 139,871 Reactive KVAH.

Total corrective KVAH. required........................122,461

A 120-KVA., 3-phase, 60-cycle, 440-volt outdoor type capacitor used indoors for dust protection. Left foreground shows motor and gear for charging kilns

correction was to be used would have to be working long enough each month to produce nearly 125,000 corrective kilovolt ampere hours.

In this particular plant there was a motor-driven compressor which was running steadily 11 hours per day and 25 days per month. Observation showed that it ran fully loaded two-thirds of that time, and with the valve opened one-third of the time. Here was an ideal place to use a synchronous motor. First the 100-hp. induction motor then driving it could be used elsewhere, and second, corrective KVA. could be obtained slightly cheaper where a mechanical load could be attached to a synchronous motor than by means of capacitors. From performance data it was found that a standard 110-hp. synchronous motor of the correct speed would produce 75 corrective KVA. besides driving the unloaded compressor, and 60 KVA. when driving it fully loaded. During the month this would produce 17,875 corrective KVAH. figured as follows:

$\frac{1}{3} \times$ 11 hrs. $\times$ 25 days $\times$ 75 KVA. =	6,875
$\frac{2}{3} \times$ 11 hrs. $\times$ 25 days $\times$ 60 KVA. =	11,000
Total corrective	17,875

During the night-time there was a sufficient load operating pumping equipment, etc., to permit the use of a 90-KVA. capacitor on the line at all times. Calculating this correction at 90 $\times$ 720 hrs. (24 hrs. per day, 30 days per month) gave 64,800 corrective KVAH.

These two units together totalled 82,675 KVAH. of the required 122,461. The rest would have to be another capacitor group separate from the first group as there was a particularly overloaded feeder to be relieved by putting a group at the far end where some large but lightly loaded motors were operating. This group would only be on when the mill was running full capacity or 11 hours per day and 25 days per month. A brief calculation showed that 150 KVA. under these conditions would produce 41,250 corrective KVAH.

This brought the total correction up to the sum of the three. The synchronous motor correction of 17,875, the 90 KVA. all time capacitor group correction of 64,800 KVA. and the 150 KVA. part time group correction of 41,250 KVA. totalled 123,925 or about 2,500 more than actually needed. This would be close enough for practical purposes as the average power conditions assumed could not be forecast any closer, and the load might increase in time so that the excess would be advantageous.

Power cost under the original condition of low power factor would be approximately \$2,700 per month, while at 95% power factor this would reduce to \$2,200, representing a saving of \$480 per month or \$5,760 per year. The total cost of the corrective equipment installed was less than \$7000, so the investment was well worth while.

The problems submitted by all of these plants were somewhat similar. The methods of correcting were usually different as conditions of equipment and operation varied greatly. In some the correction was all by capacitors; in all, capacitors played the important part as the brunt of the correction had to be borne by these silent but nevertheless important units. Their record has been remarkable as they have no failures to their discredit and they have all paid for themselves long before this.

In the accompanying illustrations some idea can be obtained of the appearance of corrective equipment and the white lime territory. The first gives an idea of the great thickness of the limestone beds and the means employed in handling the stone in the quarries. The second shows a dust-tight 150-KVA. capacitor with its oil circuit-breaker mounted separately, and the third a 150-KVA. group divided into two parts of 60 and 90 KVA. to provide greater flexibility of correction when the plant is operating under different loads.

Testing of Hollow Masonry Building Units

By HARRY D. FOSTER
Ohio State University, Columbus, Ohio

COMMITTEE C-10 on hollow masonry building units of the American Society for Testing Materials held a meeting at Washington, D. C., on April 3, at which time the committee organized new subcommittees, each of which is detailed to work on specific problems. One of these subcommittees, on concrete units, presented for committee discussion tentative specifications and tests for concrete masonry units, tentative specifications and tests for non-load bearing concrete masonry units and tentative standard definitions of terms relating to concrete masonry units.

The committee decided to submit to the society at the June, 1930, meeting recommendations to advance to standard the present tentative standard specifications and tests for hollow burned-clay fireproofing, partition and furring tile with modifications to make the classification based on absorption. It was argued that since such units in service are not required to carry load, strength should not be made a requirement for classification.

A further change in the standard specifications and tests for hollow burned clay load-bearing wall tile consisted in setting a higher weight allowance which would permit the unrestricted use of the standards where local requirements specify heavier shell and web thicknesses than is general.

Special 150-KVA., 60-cycle, 440-volt capacitor with two breakers to give 60, 90 or 150 KVA.

The Development of the Plaster Lath Board

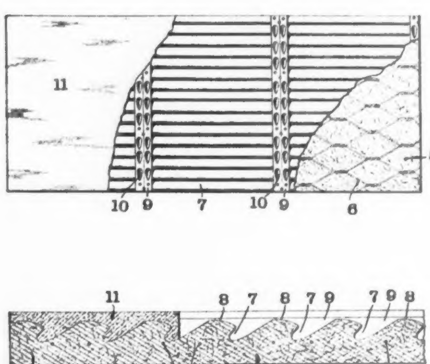
United States Patent Summary

By Joseph Rossman
Washington, D. C.

THE FUTURE DEVELOPMENT of the building industry undoubtedly lies in new building materials by means of which safe and fireproof structures can be quickly erected. Much has already been accomplished in light residential wall construction; and gypsum has played an important part in this.

In 1884 the revolutionary expanded metal patent, No. 297,382, was granted to Golding. It consisted of a sheet of metal slit and expanded so as to produce a reticulated structure suitable for receiving plaster. It was quickly adopted and was widely used in place of wooden lath in fireproof construction.

In the same year a patent, No. 297,832, was granted to Morrison for a plaster-lath board. It consisted of a slab made from lime and plaster of Paris reinforced with cocoanut fibers. The upper surface of the slab was roughened before it hardened. The slabs were then nailed to walls or ceilings and covered with a coating of plaster. This patent discloses the basic feature of the present day plaster-lath board. However, it was



Patent No. 815,751. Early type of plaster lath

neither developed nor used extensively until the last few years, chiefly because the plaster-board lath had to wait for the development of the plaster-board industry so as to be cheaply produced by the continuous process.

In the construction of buildings, especially in those districts favored with equable climate, plaster is extensively used as a surface for both internal walls and ceilings and outside walls. For the purpose of supporting the plaster surface wood lath had been employed almost exclusively until the last few years. Wood lath makes a very efficient support for plaster if properly seasoned before use, but causes cracking of the plaster due to expansion and contraction of the wood, if not thoroughly dried and seasoned before application to the wall structure.

In plastering over wood lath, the key between the plaster and the lath is formed by the plaster entering the spaces between the adjacent laths. These spaces being of considerable length require that the plaster be applied to the laths with a motion of the trowel crosswise to the extension of the spaces between the laths, in order to prevent unnecessary waste of plaster.

To overcome some of the objections to expanded metal and wire lath much effort has been expended to produce an efficient plaster lath. A number of distinct types have been developed. They will be briefly discussed here.

Types of Lath Boards

1. The early type of plaster lath board was merely a molded slab of plastic material having grooves or channels formed in its surface to receive plaster. (Patent No. 815,751). It was proposed also to use wood slabs provided with keyways or grooves for receiving the plaster. However, the wooden slab contracted and swelled, owing to the moisture in the wood. On this account the plaster tongues extending into the keyways soon broke off so that the plaster came loose from the supporting slab. This objection was overcome by using a plaster material such as plaster of Paris for the lath board.

2. Another type of lath board is made by molding a plaster material having grooves extending entirely through the board. (Patent No. 1,123,304).

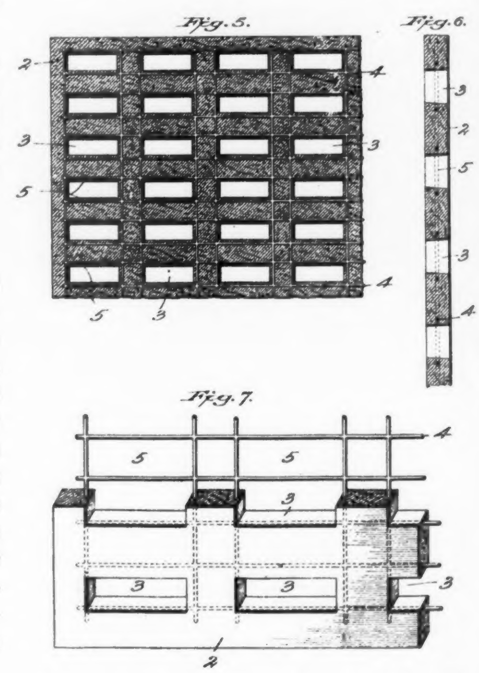
4. Lath boards having coarse fibers projecting from the surface have also been made (Patent No. 1,473,455).

4. Strips of wood lath or of plaster board have been united to a base to form a lath board (Patents Nos. 1,024,187 and 1,436,-453).

5. Spaced slabs of plastic material have been united to a wire backing as in Patent No. 608,570.

6. In late years the use of plaster board has been introduced as a support for plastered surfaces. This plaster board is commonly manufactured by enclosing a layer of plaster between two sheets of heavy paper, permitting the plaster to dry between the sheets of paper; thus forming a board which may be conveniently nailed to the wall framing with considerable economy of application over wood lath owing to the comparatively large sizes in which the plaster board is manufactured.

The difficulties encountered in the manufacture of plaster board are the tendency to warp when being dried or cured; overcuring of the edges of the board with a re-



Patent No. 1,123,304. Grooves through the board

sulting crumbling consistency at the edges; and the length of time required to properly cure the wallboard due to the insulating effect of the sheets of paper between which the plaster is placed.

Several forms of wallboard have been developed with surfaces intended to enter into bond with the plaster applied thereto, thus furnishing a means for holding the plaster securely. The advantages in the use of plaster board reside in the ease with which it may be applied, and the equal and very small expansion and contraction.

This recent type of lath board is similar to the usual plaster board except that it has grooves or channels formed in its surface

as in Patent No. 1,177,361 or perforations extending entirely through the board (Patent No. 1,268,802).

7. By using a perforated cover sheet in making plaster board some of the plaster will exude through the perforations and form button-like projections for anchoring the plaster (Reissue Patent No. 14,148).

8. A lath board has also been developed which is flexible so that it can be rolled or flexed in shipping or storing (Patent No. 1,487,370).

9. Another type of plaster board has gravel applied to one face so as to key the applied plaster (Patent No. 1,518,337).

10. Many lath boards have waterproof paper so as to prevent penetration by moisture. The entire board is waterproofed or where the plaster board is punched to provide depressions it is coated with a waterproof substance (Patent No. 1,327,446).

11. Lath boards may also be reinforced with wire, fabric or fibers.

Many other features too detailed to be discussed will be found in the abstracts given below.

Typical Processes for Making Lath Board

The principle of the lath board consists in providing a board having grooves or projections on one face for receiving and retaining a coat of plaster. The board can be easily attached to the studs and can be used anywhere where the wood lath would be used. It is then plastered over, the grooves or projections in the space of the board serving to retain the plaster firmly. By this procedure a fireproof wall can be very quickly built.

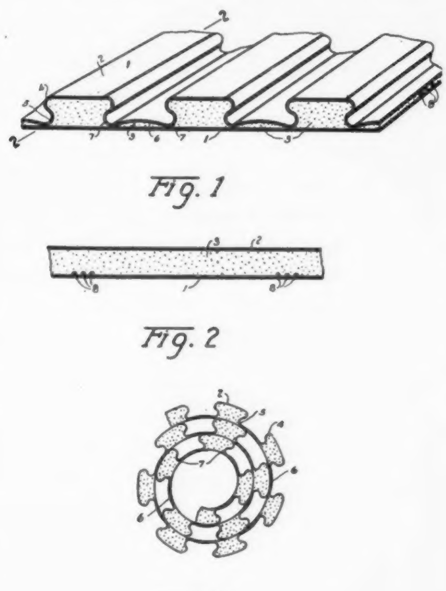
1. The early methods of making plaster lath boards consisted in placing a plastic composition into a suitably shaped mold so as to produce grooves in one face. Patent No. 442,957 illustrates the method.

2. Another method consists in forming spaced slabs of plastic material on a wire fabric as shown by Patent No. 608,570.

3. Lath boards have also been made by perforating a plaster board so as to provide keys for the plaster as shown in Patent No. 694,111. A board may also be molded so as to have plaster receiving grooves extending through the entire board.

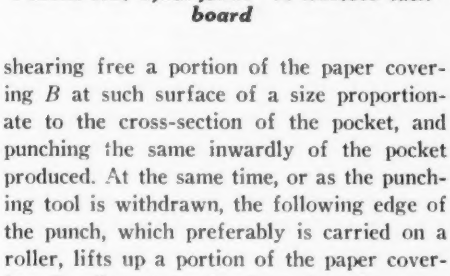
4. In Patent No. 911,223 a paper covered plaster board is made in a mold, and while the stucco is still soft the paper sheet is given indentations to hold the plaster.

5. An important advance in the manufacture of lath boards consisted in using the ordinary paper covered plaster board as the starting material for making lath board. This is illustrated in Schumacher Patent No. 1,177,361, where the usual plaster board is converted into lath board by merely forming pits or depressions in one surface by a punching tool. Referring to the drawing, the plaster board shown as comprising a body A of plastic material commingled with finely divided wood or other substances, interposed between, or to which are applied, surface sheets B of paper. This board is converted into lath by the production of a plurality of depressions, pits or key pockets b which are produced inwardly of such plaster board from one surface thereof, by a suitable tool which compresses the material of the plaster board and punches the pocket,



Patent No. 1,487,370. A flexible lath board

shearing free a portion of the paper covering B at such surface of a size proportionate to the cross-section of the pocket, and punching the same inwardly of the pocket produced. At the same time, or as the punching tool is withdrawn, the following edge of the punch, which preferably is carried on a roller, lifts up a portion of the paper covering B adjacent to the formed pocket, producing a lip or anchor c; this being due to the fact that the action upon the following edge of the roller-carried punch tool upsets or mutilates the wall of the pocket at the



Patent No. 1,177,361. Perforations in surface of the board

rearward edge thereof, beneath such paper covering, and in being withdrawn from the pocket lifts up the portion of the paper covering as stated, to produce such lip. This is assuming that the roller, such as indicated at D in Fig. 2, in which d indicates the punches, moves upon its axis in contact with the plaster board sheet which is likewise moved in a straightaway path beneath the roller. The punches are applied to the roller in straight series, and the punches of the several series may be in staggered relation throughout the series.

The final surface coating of the plaster E is applied over the plaster board lath, portions of the mass entering the key pockets or recesses b and interlocking with the plaster board lath. Furthermore, the lips or anchors c protrude into and are embedded with the plaster mass or coating, firmly interlocking to produce a bonding effect.

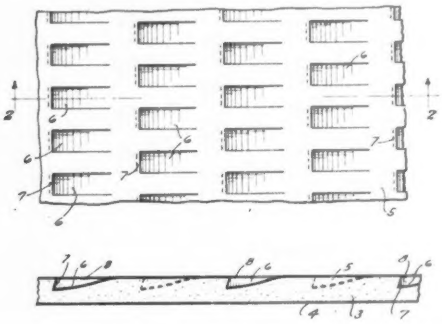
A further advance in making lath board by a continuous process is disclosed in Patent No. 1,348,898.

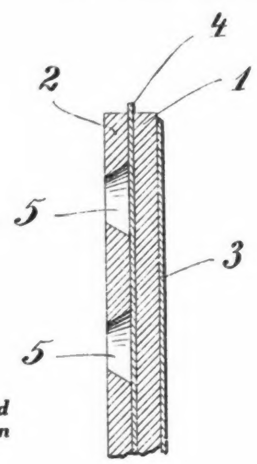
In Fig. 2 a molding base or bearing member 1 is shown in cross-section with strips or tongues 2, spaced apart, forming square channels 3 between. The paper which forms the surface of the finished plaster board, that is, the surface which has the channels and which receives the plastering material, is folded in the manner indicated at 4, and may be rolled or cut in sheets of the proper size as desired. Referring to Fig 1, the molding base or bearing member 1 is shown in the form of a wide belt 1*a*, with spaced strips 2*a*. The folded paper 4 is fed thereto, under a roller 5. The folded paper thus fits into the channels 3 and over the tongues or strips 2, as indicated in the cross-sectional view, Fig. 2 A bearing roller 6 underlies the belt 1*a*, as indicated. The plastic material of which the board is formed is fed from a hopper or chute, 7, on to the folded paper as it rests in the channels of the belt, as indicated, the material filling the space formed by the folds in the paper as the belt and paper advance. A covering sheet, 8, is fed around a roller 9, above the roller 6. This roller 9 presses the plastic material P into the folds of the paper 4, between the strips 2, 2, as clearly illustrated by Fig. 3, and at the same time applies the top sheet 8. The pressure between the rollers 6 and 9 is sufficient to fill the folds of the paper 4, in the channels 3 of the molding base, with the plastic material P without materially distorting or crumpling the paper as folded to receive the soft plastic material. The finished product is substantially as illustrated in the cross-sectional view, Fig. 3, and is easily removed from the bearing or holding base 1, or 1*a*, as the case may be.

7. The "button-lath board" is made by the apparatus disclosed in the Sexton Patent No. 1,301,513.

The finished plaster lath made by this process is shown particularly at the right-hand portion of Fig. 3. Such a plaster lath embodies a back sheet or form member 10, a body 11 of plastic or cementitious substance, which is plastic when the plaster lath is formed, and a facing sheet or form member 12 having spaced apertures 13 surrounded by individual depressions 14. A bead 13*a* is formed around each aperture for the purpose of stiffening the sheet at the bottom of the depression so as to support the bottom against the weight of cementitious substance

and against the pressure applied. The back sheet may be a plain sheet, as shown, or it may be a duplicate of the face sheet, as is the case when a double-faced lath is made. In the finished plaster lath the cementitious substance of the body protrudes through the apertures 13 into the depressions 14 to form protuberances or buttons which are preferably wedge shaped, as shown at 15; and the outer end surfaces of these buttons are in the plane of the facing sheet 12. The depressions 14 surround the buttons, allowing the applied superimposed plaster (which is applied to the face of the finished lath) to enter the depressions and set around the wedge-shaped buttons.





Patent No. 1,177,362. Plaster board converted into lath board by formation of depressions

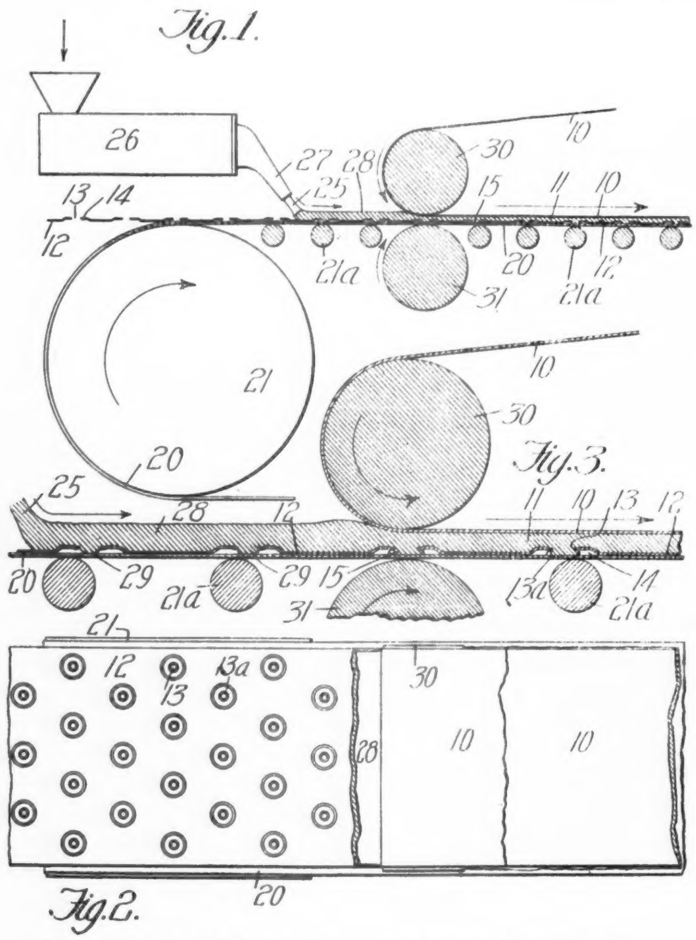
The essentials of the method of formation may be stated to be the placement of such a facing sheet as described with its face against a base surface so that the apertures 13 are spaced from the base surface as is clearly illustrated in the drawings; and the application of the plastic substance in a layer on the upper or back side of the facing in such a manner as to cause the plastic substance to flow restrictedly through the apertures into the depressions to form the buttons as illustrated. The plaster lath is made in a continuous strip (the comparative width of a strip is shown diminished in Fig. 2), and for this purpose a base surface formed by a smooth metal belt 20 which moves horizontally at a suitable speed, is employed. The face sheet 12 is fed continuously on to this belt, the plastic cementitious substance 28 is fed continuously in a continuous layer over the facing sheet, and the back sheet 10 is continuously fed on to the layer of substance. Pressure is continuously applied across the width of the layer of plastic substance, by means of rollers 30-31; and the consistency of the plastic substance is such that it is forced through the aperture in the facing sheet and into the depressions and against the surface of the belt by just the right amount to form the buttons.

At the point of complete formation, being the point between the rollers 30 and 31, the plaster lath is formed in its final shape, except for cutting and trimming to size. The continuous strip of plaster lath passes on with the belt for a considerable distance, so that by the time the end of the belt is reached the plastic cementitious substance has sufficiently set to allow the lath to be handled. The continuous strip is then cut to length, and, if necessary, further dried.

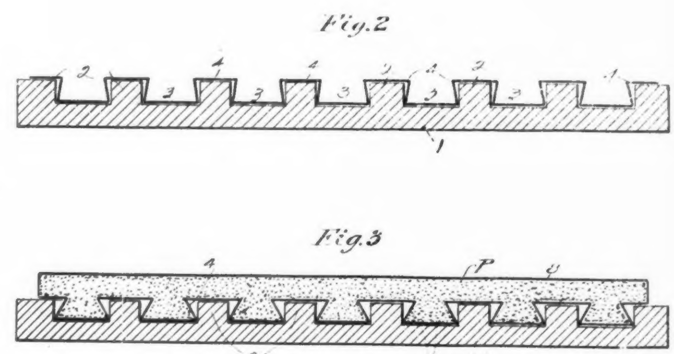
Abstracts of U. S. Patents in the Plaster Lath Board

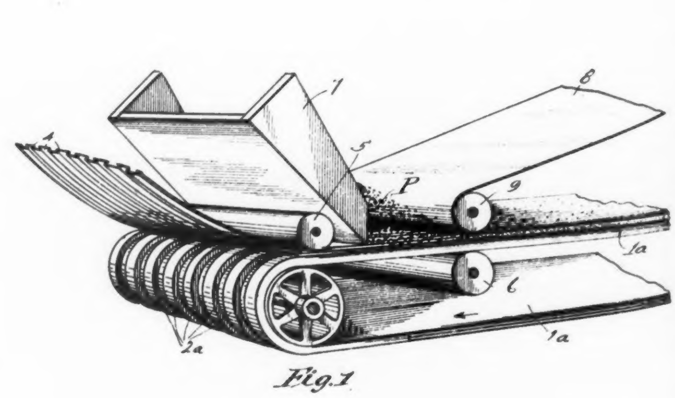
1. *Morrison, No. 297,832, April 29, 1884*—A slab adapted to be nailed to walls or ceilings made of plastic plastering material and long strands of cocoanut fibers embedded therein, the upper face of the slab being roughened to receive a coating of a hard finish.

2. *Curran, No. 442,957, December 16,*



Patent No. 1,301,513. Apparatus for making "button-lath board"





Patent No. 1,348,898. Making lath board by a continuous process

1890—A plaster-lath board having dovetailed grooves to receive plaster is made by molding plaster in a mold having wooden cores on the bottom covered with a rubber cloth which is shellacked so that plaster will not stick to the cloth.

3. Culver, No. 493,152, March 7, 1893—A lath board consisting of asbestos fiber, clay, plaster of Paris, cement and long fibres of jute, hemp or palmetto and provided with grooves to receive a coating of plaster.

4. Roome, No. 584,748, June 15, 1897—A plaster board having a corrugated surface to receive plaster. The edges are beveled.

5. Buckley, No. 608,570, August 9, 1898—A plaster board composed of a series of spaced slabs made of plaster of Paris and of a common backing of woven wire fabric upon which the slabs are mounted and which is exposed between the slabs form key-grooves which form effective gripping surfaces for the mortar.

6. Buckley, No. 616,074, December 20, 1898—A plaster board provided with a number of perforations, a number of transverse grooves on its back that connect the perforations and a woven-wire backing embedded in the board and projecting laterally beyond its edge to form a rigid, open-work selvage.

7. Buckley, No. 625,869, May 30, 1899—A hollow plaster-block having interior air-spaces, sides having slots that open into the same, interlocking edges, and slots in the said edges for receiving uprights.

8. Blazo, No. 638,493, December 5, 1899—A plaster board having a series of rows of plaster receiving apertures and a furring strip embedded in the board intermediate each pair of rows of apertures and comprising a longitudinally extending hollow rib and a pair of lateral wings embedded in the board. The furring strips are adapted to engage a wall to form a dead air space intermediate the plaster board and the wall to prevent moisture from penetrating through the board.

9. Schratwieser, No. 694,111, February 25, 1902—A plaster board reinforced with a layer of asbestos, paper or cloth provided with perforations extending through the board. One surface of the board is roughened. The edges of the board are corrugated so that when two boards are placed with their edges against each other an irregular break is provided between them into which the plaster will enter and secure the two boards together.

10. O'Brien, No. 718,214, January 13, 1903—A plaster board consisting of metallic lathing embedded in a rigid body of plastic material with the edges projecting beyond the edges of the plastic portion in all directions and forming a continuous edge of metallic lathing about the plastic body by means of which the board is attached to the framework.

11. Sharp, No. 757,060, April 12, 1904—A plaster board comprising an interior layer of waterproof fibrous material and an exterior of non-waterproof fireproof fibrous material adapted to receive a layer of plaster.

12. Seifert, No. 815,751, March 20, 1906—A supporting slab for plaster formed of plaster of Paris and fibrous material having a wire netting embedded therein, and a plurality of parallel undercut keyways formed in one face.

13. Farrington, No. 857,611, June 25, 1907—A plaster lath consisting of a flat rectangular sheet composed of a mixture of plaster of Paris and a fibrous material molded together and a reinforcing wire embedded in the sheet extending from side to side and having its ends near points where nails are usually driven through the lath.

14. Meier, No. 865,791, September 10, 1907—A fireproof lath comprising a wire netting or fabric with an inclosing mass of clay. Both faces are grooved to retain a plaster coating.

15. Mayhew, 869,638, October 29, 1907—A fireproof, plaster board having a core of perforated compo-board or a core made from thin plaited wood strips.

16. Stanley, No. 884,959, April 14, 1908—A lath consisting of sheets of paper fastened together and forming spaced tubular portions having perforated walls and a plastic filling material in the tubular portions.

17. Roberts, No. 896,326, August 18, 1908—A board having a core of plaited wood strips coated with a composition of equal parts of calcined gypsum and wood fiber.

18. Ryan, No. 897,158, August 25, 1908—A plaster board comprising a filling ot plaster of Paris having one of its faces corrugated and the other covered with a sheet of burlap, a sheet of burlap intermediate the faces of the plaster of Paris, and a layer of asbestos on the outer sheet of burlap.

19. Rader, No. 907,876, December 29, 1908—A plaster board formed of a central core of plaster of Paris and cocoa fiber coated with sheets of paper on each side. A series of perforations are provided through the board to form a mechanical bond with the coating material.

20. Fishack, No. 911,223, February 2, 1909—A plaster board having a perforated fabric reinforced core of plaster of Paris covered with paper sheets. One of the sheets is indented so as to form recesses with squared sides to receive plaster.

21. Kennedy, No. 932,141, August 24, 1909—A channeled plaster board adapted for application to curved surfaces which consists of a body of plaster having distributed therethrough, reinforcing material having elements which are separated by the surrounding plaster except at the channels where the elements of the reinforcing material are brought together and the plaster excluded so that at such places the board can be bent.

22. Janpole, No. 1,024,687, April 30, 1912—A hot plastic coating composition of asphalt, carbonate of lime and infusorial earth is applied to a board into which strips of wood are embedded.

23. White, No. 1,049,630, January 7, 1913—A structural element comprising spaced metallic members and a ribbed body of fibrous material in sheet form supporting the metallic members, the ribs being filled with artificial stone.

24. Jester, No. 1,123,304, January 5, 1915—A supporting member for receiving stucco plastering materials made of a molded member provided with rows of plaster-receiving apertures, with a reinforcement member embedded therein, comprising double rows of wires lying between the apertures in the molded member.

25. Walsh, No. 1,168,131, January 11, 1916—A plaster board formed of folding panels hingedly connected for folding into compact form for transportation.

26. Linkletter, No. 1,173,362, February 29, 1916—A composite board comprising a plurality of separate layers of plaster of Paris and a sheet of pasteboard located between the layers and adhering thereto, one of said layers being provided with anchor holes extending entirely through it and terminating flush with the adjacent surface of said sheet of pasteboard.

27. Schumacher, No. 1,177,361, March 28, 1916—The ordinary paper covered plaster board is converted into lath by producing in one surface a series of depressions or pits by a suitable tool.

28. Henning, No. 1,184,951, May 30, 1916—Cores for reinforced concrete or plaster floor construction are made from alternate layers of wood felt and plaster molded to the required shape.

29. Sexton, Reissue No. 14,148, June 6, 1916—A plaster lath having a core of plaster covered on one face with a sheet of paper and on the other face with a perforated sheet of paper, the core projecting through the perforations to form key-shaped protuberances larger at their outer than at its inner end in order to keep a coat of plaster.

30. Linkletter, No. 1,190,431, July 11, 1916—A paper covered lath board made by a continuous process having frusto-conical depressions.

31. Casse, No. 1,205,360, November 21, 1916—A plaster lath having a perforated facing sheet with surface depressions and apertures therethrough in the bottoms of the depressions and a cementitious base back of the facing sheet projecting through the apertures to form protrusions extending into the depressions.

32. Sexton, No. 1,205,399, November 21, 1916—A plaster lath, embodying a face sheet having a surface provided with dovetailed large diameter and small depth and having sloping sides, and having circular perforations at the bottoms of said depressions, and a cementitious base back of said face sheet, said base projecting through the perforations to form a protrusion in each depression, and said protrusion at its periphery clenching over the edges of the perforation.

33. Galley, No. 1,230,400, June 19, 1917—A plaster lath comprising a cement body having a surface provided with dovetailed mortises, and a face plate upon the surface provided with slots opening through the face plate to the dovetail mortises.

34. Flanders, No. 1,232,522, July 10, 1917—A plastic lathing made from a slab of plastic material having rabetted edges to interlock with adjacent slabs and having undercut grooves on one face to receive plaster.

35. Schumacher, No. 1,268,802, June 4, 1918—The usual paper covered plaster board is punched to provide perforations. One of the cover sheets is so disrupted in the production of the perforations as to provide tongues overlapping one end of each perforation to partially and yieldingly seal the same.

36. Jensen, No. 1,296,525, March 4, 1919—Lathing material comprising a plurality of wooden laths tied together by wire and a plastic binder covered on one face with a sheet of tar paper having its outer face roughened by the addition of sand or cork chips.

37. Sexton, No. 1,298,411, March 25, 1919—A plaster lath comprising a cementitious body and a perforated facing sheet, the facing sheet being corrugated to present longitudinal grooves and the cementitious body projecting through the perforations to form flaring buttons in the grooves.

38. Sexton, No. 1,301,513, April 22, 1919—A method of forming plaster lath which consists in laying a perforated sheet on a smooth surface, applying a layer of plastic substance to the back of the sheet of such consistency that the plastic substance flows restrictedly through the perforations and applying a cover sheet on the plastic substance.

39. Ford, No. 1,301,828, April 29, 1919—A plaster board comprising a sheet of paper corrugated to form interspaced lath projections and intermediate valleys, cords, threaded through the bottoms of the face valleys and extending up into and along the same and fillings of cementitious material disposed lengthwise of said valleys and filling the same and adherent to said cords.

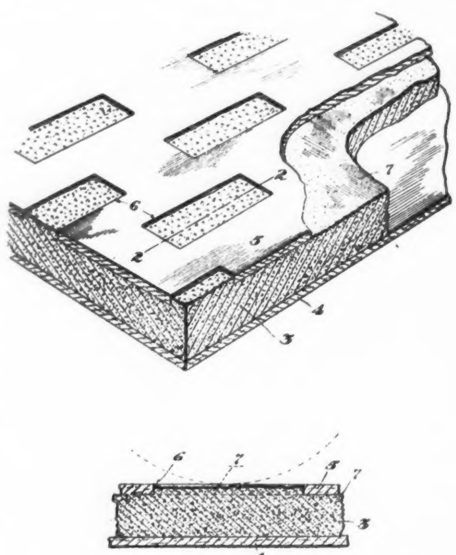
40. Herbert, No. 1,303,313, May 13, 1919—A lathing sheet material consisting of excelsior, hemp or jute fibers cemented together by silicate of soda and whiting. The surface presents an effective keying area for plaster.

41. Schumacher, No. 1,308,724, July 1, 1919—A process of making lath board which consists in interposing between sheets of paper a plastic substance, one of said sheets being corrugated and having undulations in its outer surface between grooves, and flattening the undulations whereby the sides of the grooves are pitched. Tension strips are also interposed between the sheets and adjacent the corrugated sheet.

42. Fraber, No. 1,325,241, December 16, 1919—A composition lath comprising a face sheet, a backing sheet, and an interposed body of plaster, one of said sheets being corrugated and the corrugations being internally filled with the body of plaster. The lath as a whole is formed with key-receiving openings.

43. Sexton, No. 1,325,883, December 23, 1919—A plaster-lath board comprising a body of plaster and a facing sheet impregnated with a bituminous substance. The board is heated in order to soften the bituminous substance and to allow it to permeate the plaster and the facing sheet.

44. Schumacher, No. 1,327,446, January 6, 1920—A lath board including face sheets, plaster filler between the sheets, one of the sheets being perforated and the plaster filler being exposed through the perforations, and waterproofing applied to the exposed portions of the plastic filler.



Patent No. 1,449,728. Buttress type comprising a panel of absorptive plastic material with series of aperatures

45. Routt, No. 1,348,898, August 10, 1920—A lath board is made by continuously feeding a sheet having longitudinally extending dove-tail formations on to a similarly shaped supporting belt, applying plaster on the sheet and then a top cover sheet. Patent No. 1,493,899, May 13, 1924, discloses a machine for carrying out the process.

No. 46. Dooley, No. 1,379,444, March 24, 1921—A plaster board formed from alternating layers of paper and cementitious material and spaced metallic nailing and reinforcing strips embedded in the body adjacent the first layer. The board is provided intermediate the strips within punctures arranged in staggered relation which define locking tongues or keys for a plaster coat.

47. Routt, No. 1,382,550, June 21, 1921—A paper covered lath board having a core of kieselguhr or sawdust and calcined gypsum as a binder so as to provide a lightweight and fireproof board. One surface is grooved longitudinally to key plaster material.

48. Hicks, No. 1,406,188, February 14, 1922—A lath board comprising inner and outer facing sheets, and a composition filler interposed between the sheets, the filler being formed with rows of spaced slots, and the sheets formed with openings registering with the slots, and the sides of the slots being lined with overlapping flap turned into the slots from the facing sheets.

49. Lockhart, No. 1,423,569, July 25, 1922—Wall board composed of a mixture of plaster of Paris, lime and shredded wood fibers incorporated therein, the fibers being several times greater in length than the thickness of the board and producing a roughened surface to which finishing material may be applied.

50. Lichtenberg, Reissue No. 15,440, August 29, 1922—A building unit having a wire reinforced core of oxy-chloride cement with suitable filling agents and a backing sheet of tar paper.

51. Hicks, No. 1,430,080, September 26, 1929—A composition lath board comprising a body of plastic material provided with a facing sheet formed with perforations, the flaps being turned to extend over the opposite side walls of the recesses.

52. White, No. 1,431,550, October 15, 1922—A lathing structure comprising interwoven metallic and nonmetallic members, each nonmetallic member being of flat strip or like form, and consisting of outer waterproofed facing elements and an intermediate filler of artificial stone material, said member having therein a plurality of body-reducing openings.

53. Marks, No. 1,436,453, November 21, 1922—A lath material comprising a sheet of paper having cemented thereto strips or laths of plaster board, such strips being formed of a plaster core and having paper faces, one of which is cemented to the paper sheet, the paper having perforations therein through which the plaster may form locks.

54. Buttress, No. 1,449,728, March 27, 1923—A composition lath comprising a panel of absorptive plastic material, a backing sheet covering one side of the panel, and a facing sheet extending over the other side of the panel, the said facing sheet being formed with a series of apertures into which portions of the plastic composition project and terminate substantially flush with the outer surface of the facing sheet forming exposed areas of plastic material throughout the panel, the exposed areas being roughened. The process of making the board is given in Patent No. 1,538,087, May 19, 1925.

55. Roberts, No. 1,462,579, July 24, 1923—A lath of plastic material reinforced with wire fabric which extends beyond the edges of the body. A backing of tar paper is applied to the lath and the opposite face is grooved.

56. Packard, No. 1,466,805, September 4, 1923—A slab formed of a calcined slate clay and having channels and ridges and beveled rear edges for keying stucco or plaster to the slab and having nail holes formed therein for securing the slab to a structure.

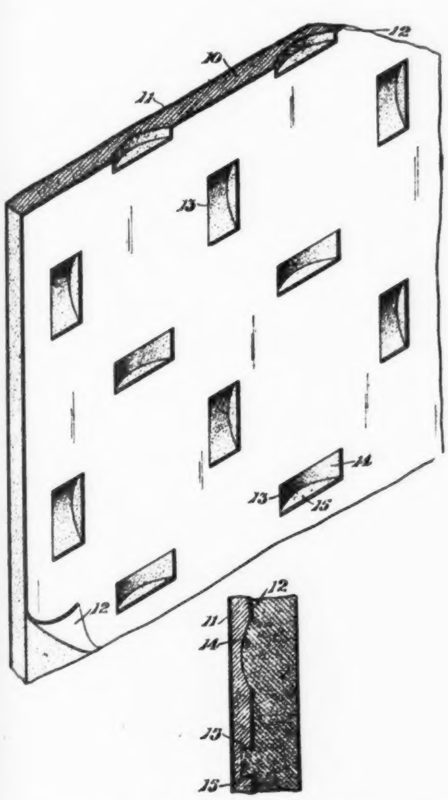
57. *Schumacher, No. 1,473,445, November 6, 1923*—A plaster lath board made from a composition of portland cement and wooden shavings treated with lime placed upon a paper backing and having a roughened plaster receiving surface.

58. *Birdsey, No. 1,487,370, March 18, 1924*—A plaster lath made of paper cover sheets with plaster of Paris between them. One sheet of the board is flat and the other sheet is formed with a series of ribs or corrugations, the corrugated sheet contacting with the flat sheet at each side of the bottom of the corrugations whereby the two sheets form a series of hinges at different points with a body of plaster between the hinge points.

59. *Schumacher, No. 1,487,894, March 25, 1924*—A process of making lath board which consists in continuously passing a sheet of paper on a moving belt applying plastic material and then applying a slitted cover sheet on top of the plastic material by means of a roller having projections so as to form depressions or pockets in the board.

60. *Schumacher, No. 1,498,814, June 24, 1924*—A lath board made according to the process of the preceding patent.

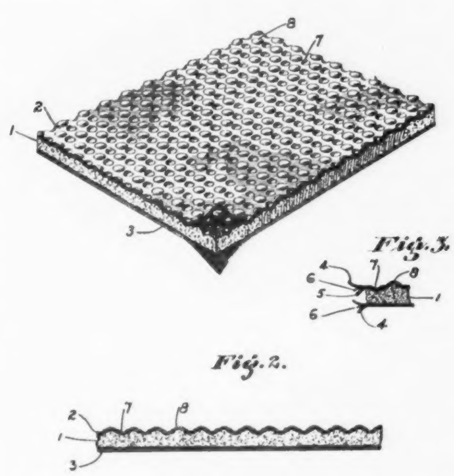
61. *Hicks, No. 1,506,931, September 2, 1924*—A lath board covered on its opposite sides by facing sheets of paper, one face being smooth and the other face formed with recesses having the side walls covered by facing flaps to prevent too rapid absorption of moisture from the plaster by the plastic body. The machine for making the board is disclosed in Patent No. 1,464,360, August 7, 1923.



Patent No. 1,546,151. Distinguished by rows of rectangular recesses

62. *Makowski, No. 1,518,337, December 9, 1924*—The ordinary plaster board has an emulsion of asphalt and silicate of soda applied to one face and mineral fragments imbedded therein.

63. *Makowski, No. 1,518,338, December 9, 1924*—Silicate of soda is applied to one face of the usual plaster board, finely divided mineral fragments are embedded in the sili-



Patent No. 1,586,018. Characterized by intermediate knob-like projections

cate which are sprayed with a solution of casein and lime.

64. *Makowski, No. 1,524,938, February 3, 1925*—A plaster lath having a coating of magnesite and magnesium chloride in which mineral fragments are embedded for keying plaster.

64a. *Makowski, No. 1,524,939, February 3, 1925*—A plaster board is formed with paper cover sheets treated with rosin size so as to retard permeation by moisture. A coating of casein, lime and china clay is then applied in which mineral fragments are embedded.

65. *Strand, No. 1,546,151, July 14, 1925*—A plaster lath board having a plane working surface and rows of rectangular recesses formed or cut in the face and arranged alternately at right angles to each other.

66. *Makowski, No. 1,548,538, August 4, 1925*—A lath board having longitudinal grooves at its edges so that when two boards are set edge to edge a dove-tailed groove will be formed.

67. *Buttress, No. 1,549,292. August 11, 1925*—A lath board similar to Patent No. 1,449,728 coated with an adhesive glue and dextrine which acts to bind the plaster coating to the board.

68. *Turk, No. 1,553,412, September 15, 1925*—A building board for wall construction comprising a composition base having spaced undercut grooves at one surface and a burlap of coarse mesh stretched across the surface and covering the grooves whereby a cementitious coating applied to said surface may be forced through the burlap to fill the grooves.

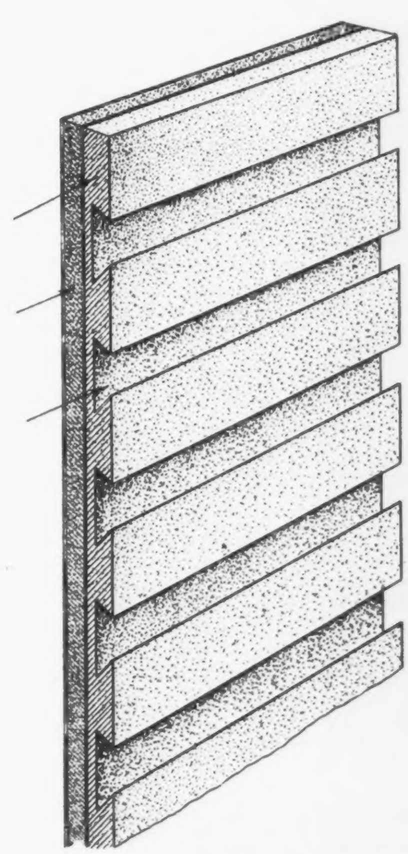
69. *Buttress, No. 1,568,314, January 5, 1926*—A composition wall board comprising a facing sheet having a multiplicity of laterally and longitudinally spaced recesses formed on the inner side thereof, the walls of which form protuberances on the outer sides of said sheet, a plastic body to which the facing sheet is applied with its inner recessed face adhered to the plastic body with portions of the plastic body extending into the recesses thereof.

70. *Buttress, No. 1,569,947, January 19, 1926*—The usual plaster board is provided with perforations extending entirely through the board. The perforations are formed of two frusto-conical co-axial holes having their smallest diameter near the center of the board.

71. *Westberg, No. 1,586,018, May 25, 1926*—A plaster board covered with paper sheets having a layer of waterproof adjacent the plaster core. One surface is provided with a plurality of knob-like projections and a plurality of indentations formed intermediate the knob-like projections.

72. *Schumacher, No. 1,587,189, June 1, 1926*—A machine for forming plaster lath comprising means for continuously advancing covering sheets and introducing a plastic body therebetween to form a green board, endless conveyers to receive the formed board, an anvil roller beneath the upper bight of the conveyor and hammers positioned above the conveyor and anvil to strike the board so as to penetrate the board and express plastic material to form pockets.

73. *Makowski, No. 1,587,973, June 8, 1926*—A composition lath consisting of calcined



Patent No. 1,587,973. A lath board with dove-tailed grooves

gypsum, casein and a waterproofing element, sawdust and dextrine provided with dovetailed grooves.

74. Schumacher, No. 1,589,569, June 22, 1926—A process of making plaster board lath which consists in moving punching bodies over the green plaster board so as to form depressions in the board covered with paper flaps.

75. Strand, No. 1,589,724, June 22, 1926—A plaster board having key slots and metal staples extending across the slots.

76. Peters, No. 1,604,236, October 26, 1926—A plaster board having a fibrous netting on the surface through which project bodies of plaster forming the surface of the board throughout the entire area with ridges.

77. Jensen, No. 1,635,214, July 12, 1927—A flexible wallboard consisting of woven-wire fabric, a plurality of bars of plaster board material formed in the wire fabric in spaced relation to each other to leave portions of the fabric completely exposed, the bars having their adjacent edges beveled at both sides of the fabric.

78. Strand, No. 1,640,736, August 30, 1927—A plaster board having staple-like devices inserted through the board to hold woven wire in spaced distance from the surface of the plaster board.

79. Routt, No. 1,646,597, October 25, 1927—A process of making plaster board which consists in pressing a sheet having openings on a plastic material with a lap of the same sheet above the portion having the perforations to overlap the perforations and causing the plastic material at the openings to be roughened by removing the lap of the sheet from the perforated sheet.

80. Routt, No. 1,646,598, October 25, 1927—A plaster board having channels or key ways formed in one face covered with paper waterproofed on its side next to the plastic material and untreated on its outer side so as to adhere to applied plaster.

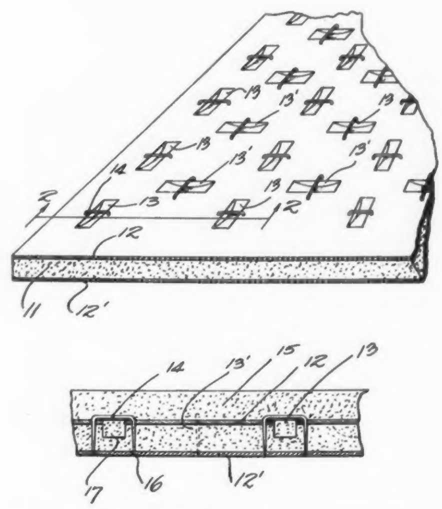
81. Strand, No. 1,664,837, April 3, 1928—A plaster board provided with longitudinal and transverse keying slots having sides at right angles to the surface of the board; and a plurality of plaster reinforcing wires secured to the sides of, and entirely outside of the plaster board, and arranged criss-cross over a portion of the slots.

82. Routt, No. 1,668,869, May 8, 1928—Plaster board lath made of plastic material and cover sheets on opposite sides, one side of the plaster board lath having a series of concaved depressions formed by a jab to depress the cover sheet into the plastic material, the cover sheet being pulled apart at one side of the depression with ragged edges exposing the plastic material between the ragged edges on an inclined surface below the plane of the surface of the board lath.

83. Strand, No. 1,673,128, June 12, 1928—Staples are driven through a plaster board and clinched, the loop portions of the staples projecting from the surface of the board to provide a bonding surface for plaster.

84. Buttress, No. 1,694,640, December 11, 1928—A lath board comprising a facing sheet, a backing sheet, and a layer of plaster interposed between said sheets; the facing sheet being formed with a series of embossments arranged to afford interruptions throughout the surface of the sheet in all directions crossing the sheet.

85. Makowski, No. 1,705,775, March 19, 1929—A plaster lath including a supporting member comprising plaster board having a center core containing dextrine as an adhesive to adhere the core to the surface sheets, and a plaster key of comminuted mineral fragments adhered to the outer face of one sheet.



Patent No. 1,589,724. Has key slots and metal staples extending across the slots

86. Schumacher, No. 1,719,200, July 2, 1929—A plaster board consisting of a slab of cementitious material with protecting strips of paper solely embracing the edges thereof and overlapping both of the slab faces at the margins and inset so as to be flush therewith, thereby exposing the major portions of the faces of the slab.

Oregon Lime Products Co. Plant Bought—To Be Reopened

AFTER being idle for more than two years while involved in litigation, the plant of the Oregon Lime Products Co., two miles from Agatha, Idaho, will resume operations within a short time backed by strong financial interests of Portland.

Recently the 40 acres of land owned by the products company was sold under auction at the front door of the court house in Lewiston, Idaho, by Deputy Sheriff Howard Coburn to satisfy a judgment of $29,164. The only bidder was Leo Hahn, representing creditors of Portland and Spokane, whose bid was $28,000. At a sale conducted in March the personal property of the company was purchased by Hahn for $100.

Before leaving Lewiston for Portland, Mr. Hahn said that it was the intention of his associates and himself to operate the property, declaring it to be one of the most valuable deposits of lime rock in the United States. Mr. Hahn and his father, Henry Hahn, are interested in the Wadhams Grocery Co., Portland, and have extensive livestock interests in several parts of the northwest.

"Upon returning to Portland I shall place squarely matters before those interested and this will result in the installation of new equipment and the plant starting operations within a reasonably short time," Mr. Hahn said.

Among the improvements outlined was the installation of two Diesel engines to replace antiquated steam engines. "The coal bill at the plant was enormous under the old management," he said.

"It will be our intention to start on a small scale and gradually reach our goal, improving as we proceed," Mr. Hahn stated.

When operating, the products company was the second largest shipper on the Clearwater branch line of the Camas Prairie railroad, averaging 25 carloads per month of crushed rock. It was estimated that in 1929 that the ground holdings of the company and its plant equipment were valued at not less than $400,000, this estimate being made by an engineer named La Valle of Portland, sent here by creditors of the defunct company.

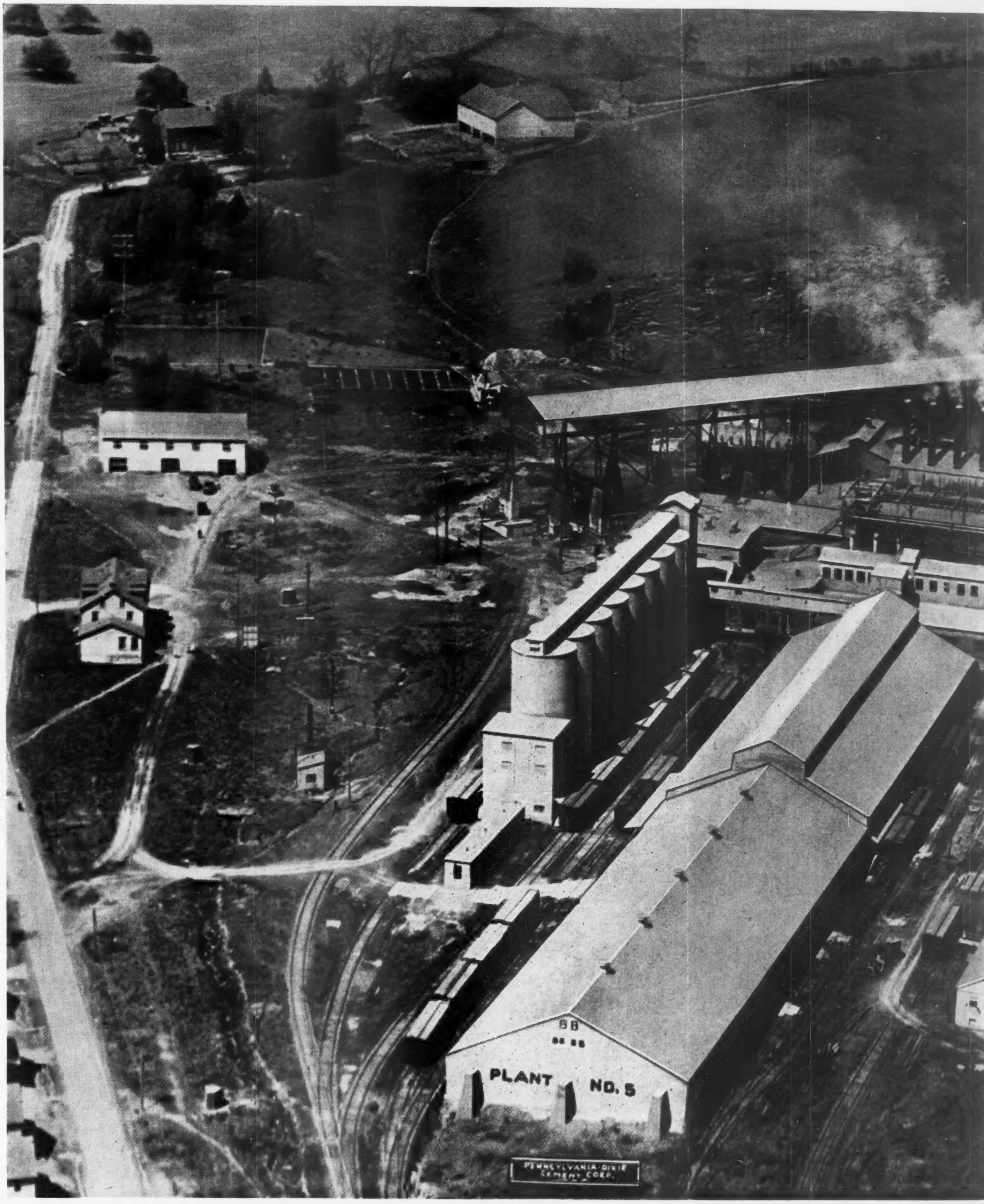
The deposit of rock stands out from the surface and has been estimated in hundreds of millions of tons. It is in great demand for chicken grits, dash for stucco and flushing purposes, and is said to be the largest deposit of its kind in the world.—*Lewiston* (Idaho) *Tribune.*

Uses of Graphite

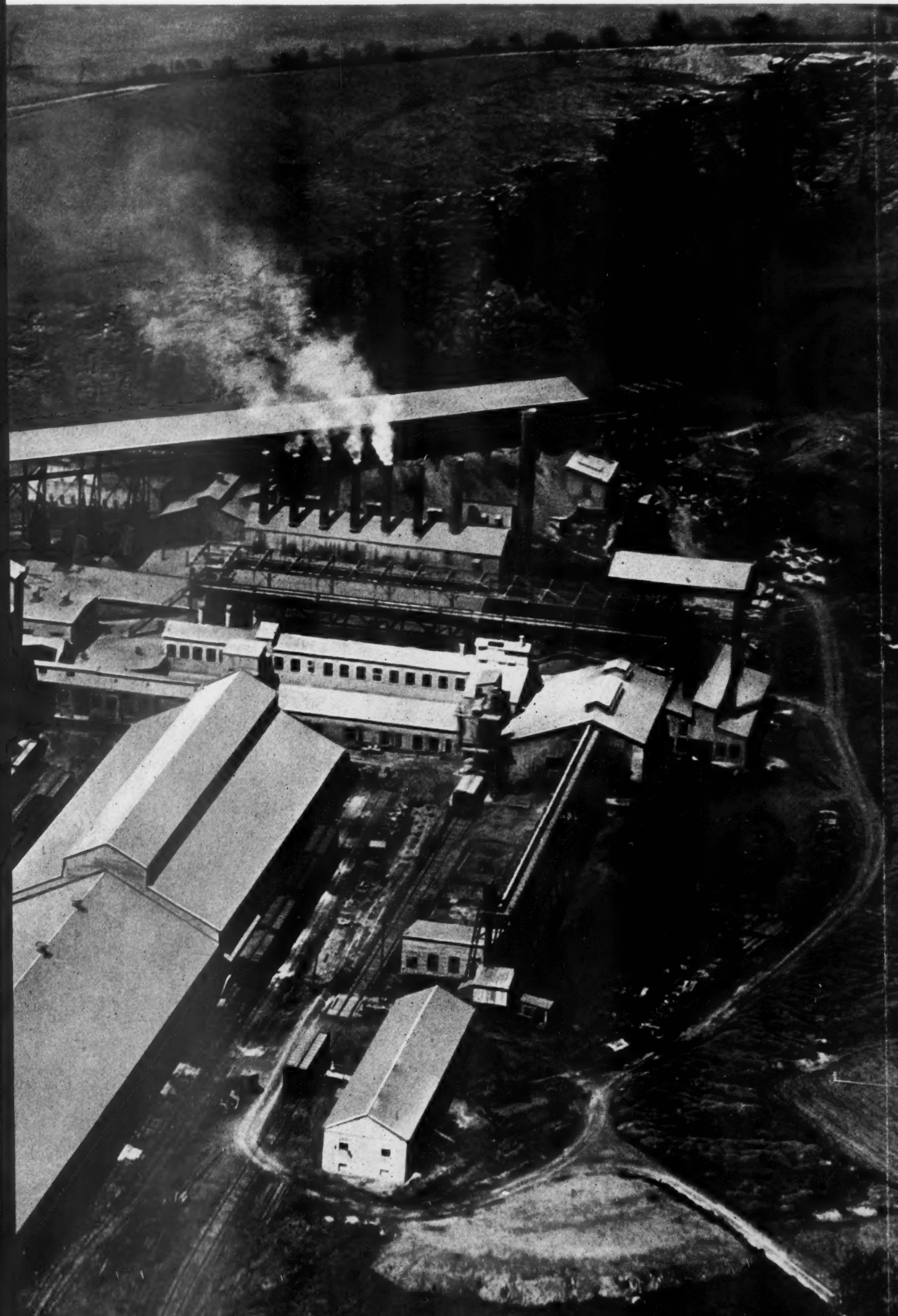
NATURAL GRAPHITE is used chiefly in the manufacture of foundry facings, pigments and paints, crucibles, pencils, and crayons, commutator brushes, stove polish, lubricants, retorts, and batteries, says the United States Bureau of Mines in a recently published report. During the last few years the use of graphite in the United States has undergone radical changes. Uses that a few years ago consumed a large proportion of the supply are now relatively of minor importance and uses which were unimportant have become important. Before the world war the manufacture of graphite crucibles consumed more than one-half of the supply; at present this proposition has dwindled to about 13%, while the use of graphite in foundry facings now accounts for 50% or more of the total consumption of the material.

The use of manufactured graphite, started at Niagara Falls, N. Y., in 1897, has developed so rapidly that its production now exceeds the output of natural graphite.

Supplement to Rock Products, Volume



Pennsylvania-Dixie Cement Corp. plant No. 5 at Nazareth,



ixie Cement Corp. plant No. 5 at Nazareth, Penn.; annual capacity, 1,200,000 bbl.

ay 10, 1930

The Experience and Trend of the Alabama Graphite Industry*

By Walter B. Jones
State Geologist, University, Ala.

THE GRAPHITE INDUSTRY in Alabama, and, indeed, that of the entire United States, has been characterized by its ups and downs, particularly the latter. The use of graphite is varied and wide, touching people in all walks of life. While the bulk of the production finds its way into crucibles, brushes, foundry facings, electrodes, lubricants and the like, the best known use is in "lead" pencils.

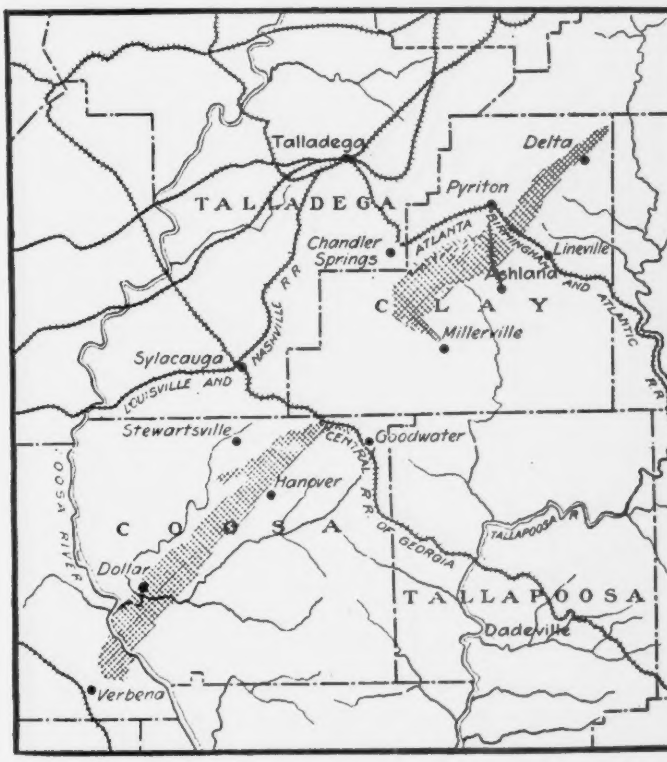
In 1888, an effort was made to use water flotation on the Alabama ores, long known to geologists, but not seriously considered until that time. The mill was small and ill adapted and the very intimate association of the graphite with the country rock, caused the experiment to be a failure. A fine stamp mill was used to crush the ore, which was then agitated in water troughs with the expectation that the graphite would be floated off and the gangue remain in the trough. In 1899, however, A. A. Allen successfully used log washing of the ores, producing several hundred tons of a very good grade of flake graphite. This was the real beginning of the industry, which showed gradual development to a sound basis by the outbreak of the World War.

Rise of the Industry

This incident brought about a much more extensive market for graphite, and the embargo placed on imports from Ceylon and Madagascar made it necessary that the domestic production be increased to meet the demand. The attendant higher prices and perhaps a surge of patriotic spirit, assisted the building in Alabama of a real and important industry, with 14 companies reporting production in 1917 and 30 in 1918, with several plants then under construction. The production for that year was nearly 8,000,000 lb., or about 60% of the United States' total. The other principal producing states were New York, Pennsylvania, California and Texas.

Fall of the Industry

The close of the World War and the subsequent lifting of the embargo unloaded on this country the large stocks of reserves in Ceylon and Madagascar, bringing the domestic producers face to face with an impossible situation. Their plants had been built under the influence of cost inflation, both in machinery and labor, to produce graphite profitably at a price of about 12c per lb. The owners of these expensive plants found a tumbling market, with the sales price of graphite slumped to about 6c per lb. in 1920 and destined to go still lower. The result was inevitable, most of the plants closing down or going into the hands of receivers.

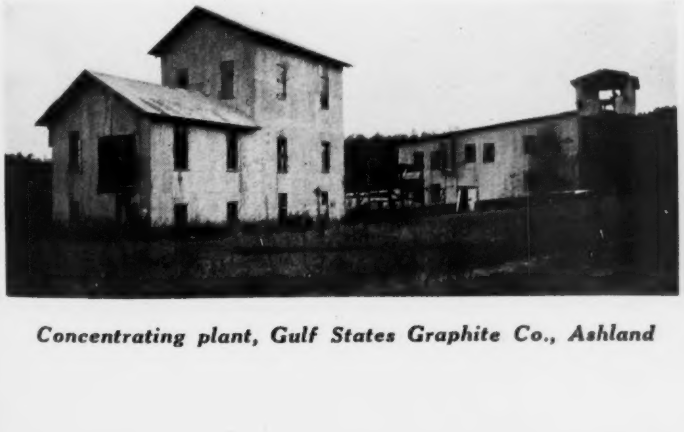


Sketch map showing approximate extent of the graphite deposits in Clay and neighboring counties

Readjustment of the Industry

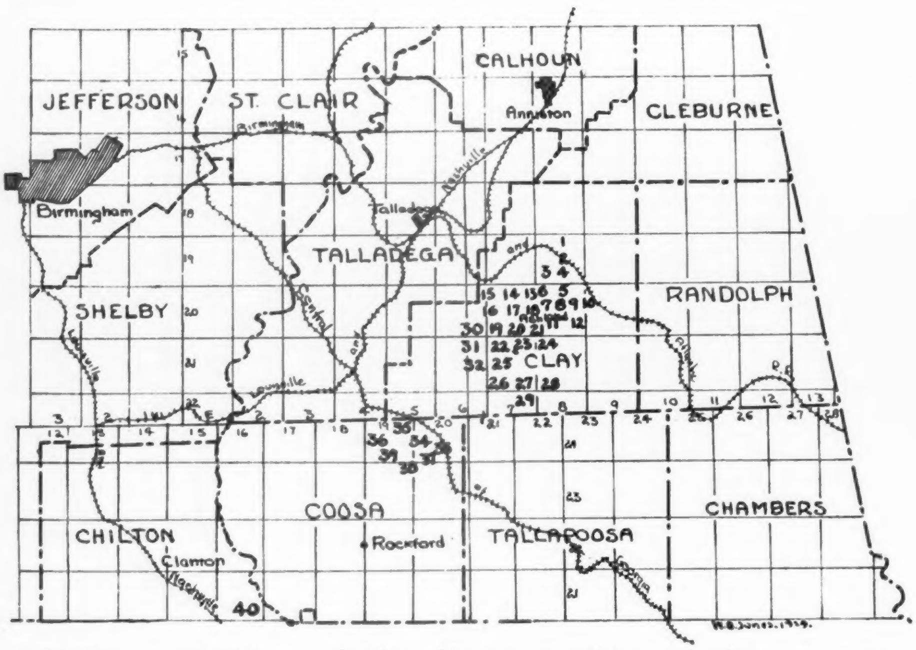
The tariff act of 1922 (amorphous, 10% ad valorem; lump, chip and dust, 20% ad valorem; crystalline flake, 1½c per lb.) offered sufficient encouragement to some of the old producers to hold out awhile longer, or to play for the breaks. Loop-holes in the tariff, particularly in the matter of classification, prevented a prosperous readjustment to peace-time conditions. In spite of the handicaps, three plants are in operation in Alabama, one in Texas, with two others contemplating rehabilitation of old plants in Alabama. It has been unfortunate that these plants have not had a proper chance for experimental work, to determine new methods for treating the ores and improving existing processes. It is difficult to get this work over in the face of overwhelming entries in the cost column. As a matter of fact, all of the producing plants use different proc-

*Published by permission of the Geological Survey of Alabama.



Concentrating plant, Gulf States Graphite Co., Ashland

National Flake Co.'s mill near Ashland



Sketch map of Alabama, showing plants in operation, or ready to operate, during the World War

1. Liberty Graphite Co.
2. Lineville Graphite Co.
3. Quenelda-Carbon Mtn. Plant.
4. Quenelda-Peerless Plant.
5. Crystalline Flake Graphite Co.
6. Monitor Graphite Co.
7. King Graphite Co.
8. Graphite Mills, Inc.
9. Quenelda-American Plant.
10. Jennings Graphite Co.
11. Republic Graphite Co.
12. Clay County Graphite Co.
13. Acme Graphite Co.
14. National Graphite Co.
15. Southern Graphite Co.
16. Ashland Graphite Co.
17. Griesemer Graphite Co.
18. Southern Star Graphite Co.
19. May Bros. Graphite Co.
20. Axton-Noe Graphite Co.
21. Quenelda Graphite Co.
22. C. B. Allen Graphite Co.
23. Alabama Graphite Co.
24. Pocahontas Graphite Co.
25. Jefferson Graphite Co.
26. Eagle Graphite Co.
27. Superior Flake Graphite Co.
28. Crucible Flake Graphite Co.
29. Empire Graphite Co.
30. Enterprise Graphite Co.
31. Atlas Graphite Co.
32. Hood-Graves Graphite Co.
33. Diamond Graphite Co.
34. Bernstein Graphite Co.
35. Ceylon Graphite Co.
36. Duro-Flake Graphite Co.
37. Graphite Company of America.
38. Goodwater Graphite Co.
39. Parkdale Graphite Products Co.
40. Flaketown Graphite Co.

Note: The three producers at the present time are the following:
27. Superior Flake Graphite Co., Chicago capital.
33. Ceylon Graphite Co., now Southwestern Graphite Corp., Boston and Burnet, Texas.
40. Flaketown Graphite Co., now Bama Graphite Mines, a subsidiary of the Alabama Machinery and Supply Co., Montgomery.
Planning to produce in the near future are:
3, 4, 9, 23 and 28, now under the Alabama Quenelda Graphite Co., Birmingham.
14, 17 and 31, reorganized by the United States Fuel Co., Birmingham.

esses in separating the marketable graphite.

Present Practice

Brief descriptions of the operating plants are as follows:

Bama Plant—This plant is located four miles northeast of Mountain Creek postoffice, and five miles from Verbena, Chilton county. The ore is loaded in the quarry by steam shovel, the cars drawn to the incline by a mule, and lowered to the gyratory crusher. From the crusher it goes through automatic feeders into rolls, and then into a modified Allen cone. The fines from the rolls are fed into flotation machines, two sets of which bring the material up to the run of mill concentrates, or about 70% carbon. The concentrates are dried at this point and run through electro-static machines, which take out additional siliceous material and mica. The final stage is screening into the various products: Bama flake, Barneco flake, dust.

Ceylon Plant—This plant is located in Coosa county near the Clay county line, four miles from Hollins, the shipping point. Here the ore goes through a gyratory crusher and then into rolls and finally into ball mills. From the ball mills, the fines go to the flotation machines, mediums back into the ball mills, the rest returned to the rolls. The flotation machines are installed in circuit, and the concentrates are run into a mineral separation machine, the sand tailings separated here returned to the system for another trip through the mill. The concentrates from the mineral separation machines go to a wet table and finally to an Oliver filter, where they are dried. The final treatment, corresponding to the electrostatic machines of the Mountain Creek plant, is by air separation, after which the graphite is screened into the various products: No. 1 flake, No. 2 flake, No. 3 flake, dust.

Superior Plant—The ore from the Superior quarry is dumped into a jaw crusher, with the fines being screened off into the bin. From this bin the material is fed by an automatic plunger into a rod mill, and then into flotation machines called "sand classifiers," where a 45% carbon concentrate is given. Most of this goes on into regular flotation machines, reground in a ball mill and then into "cleaning" flotation machines. The concentrates again enter a ball mill and are cleaned again by flotation, after which they go over a Portland filter. At this point the material is rather high grade, is dried in a rotary drier fired by fuel oil, and screened into the following products: No. 1 plus flake, No. 1 flake, dust.

Occurrence

Graphite schists are known to extend through portions of Chilton, Coosa, and

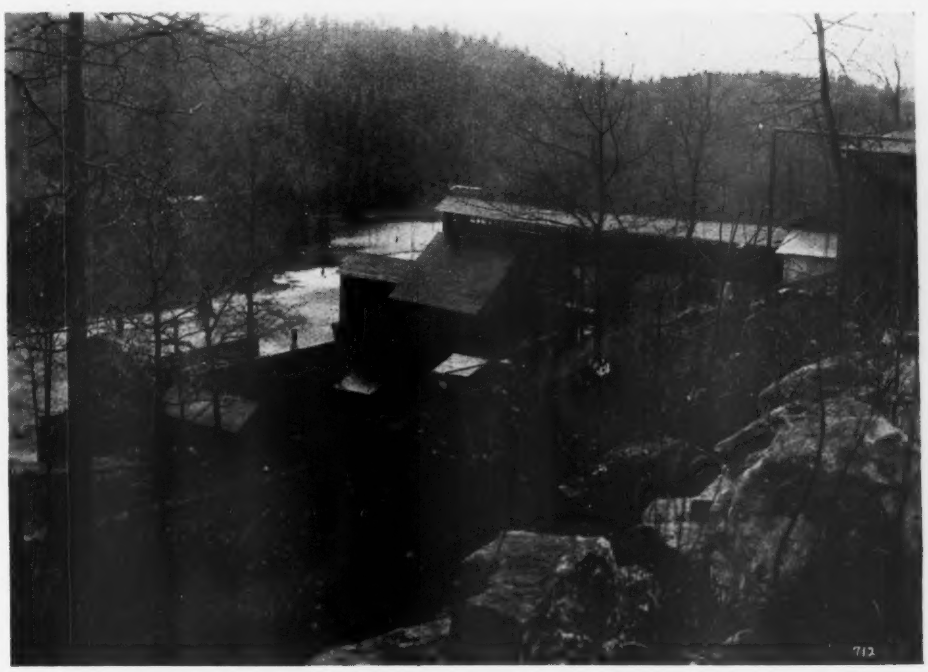
Looking down into the No. 1 quarry, Griesemer company

National Flake Co.'s quarry near Ashland

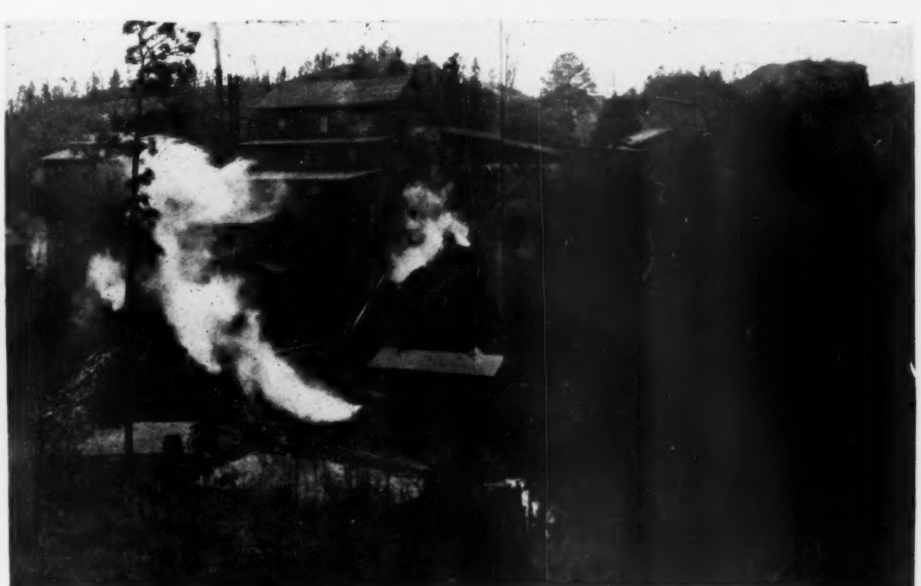
Left—The old Bama quarry and, right, the present workings. The schist is weathered to a depth of about 100 ft. and permits power shovel excavation

Clay counties in a northeast-southwest direction, having a total length of outcrops, exclusive of the gap between Goodwater and Millerville, of about 60 miles, with a maximum width of approximately five miles. At the southwestern end, in the vicinity of Verbena, the older rocks disappear beneath the Cretaceous sediments, and it is likely that the graphitic rocks continue underneath the blanket. Graphite was encountered in a test for oil in Pike county, 85 miles southeast of Verbena, at a depth of 2665 ft. The core was considerably deformed during drilling, for the beds were extremely hard to penetrate, but there is no question about the identity of the material taken from the core barrel.

Some fifteen graphite leads have been recognized, extending about 60 miles in a northeast-southwest direction through Clay, Coosa and Chilton counties, with minor deposits known in Cleburne county. The leads are usually less than 100 ft. thick, and often split into several smaller ones or disappear entirely. Only the weathered ore is used, due to lower costs in quarrying and milling. The weathered zone extends to a depth of 35 to 100 ft., with occasional "horses" of hard unweathered schist. The graphite occurs as thin flakes disseminated through a schist, carrying quartz, sillimanite, feldspar, muscovite and biotite mica, garnet, limonite, apatite and pyrite as accessory minerals or gangue. Most of the ores average about 2½% carbon in quarry-run samples, while the "blue-rock" usually carries about 8%.



The Ceylon plant showing the conveyor shed, mill and tailings pond at the left



The Bama mill, largest in the district, with the quarry at the extreme right

Mining Methods

The characteristic deep weathering of the ore leads makes open cut mining rather ideal, with steam shovels largely employed in loading the cars. The low cost of handling the ore, and the thorough distribution of the graphite throughout the weathered zone, makes it unnecessary to strip the quarries. Most of the ore leads occur near the brow of a prominent ridge, so that there are

The new Ceylon quarry has been developed to a width of about 100 ft. with a face 800 ft. long and 35 ft. high. Undecomposed schist, center foreground, is left in the workings

few water troubles in the pits, although it is often difficult to obtain enough to run the mill. Most of the mills are built along the slopes of the ridge in order to obtain every advantage of gravity handling of the ore through the various processes.

Milling Methods

From the storage bins, which are scarcely large enough for more than a day's run, the ore is fed into primary crushers, either jaw or gyratory, for sizing to 1 in. or smaller. The ore is then dried and passed through rolls, where it is again reduced and screened, the coarse going back through the rolls while the fines go to the flotation machines, or air separators, where the first graphite concentrates are obtained. The flotation machines are troughs 5 to 9 ft. long, 6 to 10 in. wide, and 12 to 18 in. deep. The water and oil is supplied in a thin curtain from the top and along the entire length of one side and overflows, or is forced by revolving blades, into a launder on the opposite side from the water intake. The rolls fines are fed into the surface of the water in a uniform stream by automatic devices, and the run of mill concentrates result. The carbon content at this point is about 70%, with some free and intercalated quartzite, and mica.

From the launders, the concentrates go to shaking screens or filters for the removal of surplus moisture. A fine spray playing over the run of mill removes some fine grit. The concentrates are then dried on steam floors, cylindrical rotary driers or some such device and are then ready for the final concentration.

The final stages of the concentration show quite considerable variation, but generally consist of grinding in buhr-stone mills to break up the intimately associated quartzite and screening in bolting mills, or inclined shaking screens, where the flakes pass into storage bins and the dust and fine grit go together.

The main effort in all the mills, is to obtain as high percentage of No. 1 and No. 2 flake, which constitute by far the most valuable product.

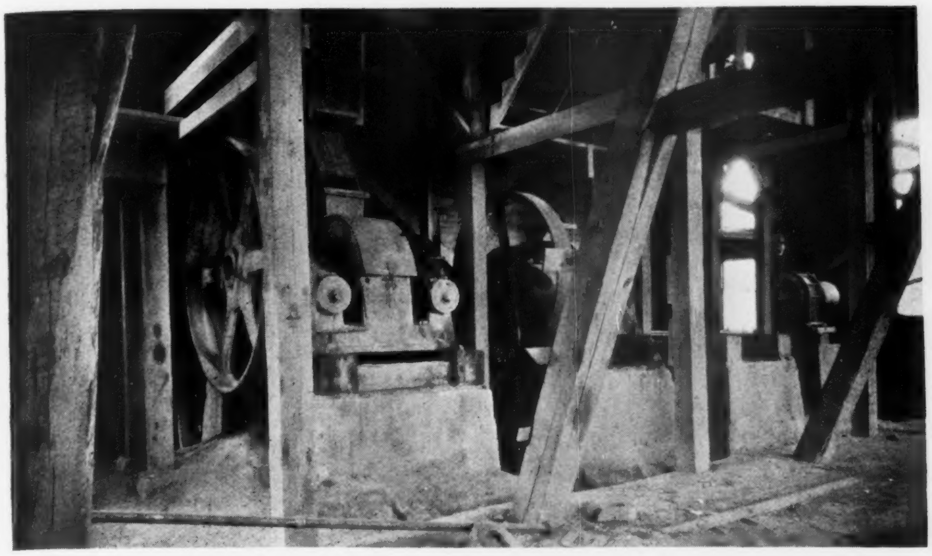
Possible Improvements

It is obvious that useful improvements would be in the design and construction of machinery or processes which would recover a greater proportion of flake, which is by far the most valuable product. One of the present drawbacks is the intense crushing necessary to obtain concentrates carrying as much as 90% carbon (graphite). This is due to the interlaminated mica and quartz, which can be removed mechanically only after thorough crushing. This has a tendency to break down the flake, giving a lower production of this valuable product than would be possible under more ideal conditions. Little change could be anticipated in the quarrying and handling of the ore.

Perhaps the most promising improvement is the Lloyd-Kennedy patented process for chemical treatment of the run-of-mill concentrates. Dr. Stewart J. Lloyd, head of the Department of Chemistry, Ceramics and Metallurgy, of the University of Alabama, has furnished the following account of this process:

"The mechanical concentration of graphite ore is effective in removing the gangue

A new lead at the Superior quarry showing the loading bins and the small mule-drawn cars underneath



Crushing rolls at the Griesemer plant

only up to a certain point. The chemical treatment here used removes practically all of the rest of it. The process consists of two parts: (*A*) Digestion of the graphite with hot concentrated caustic soda: *(B)* Recovery of the caustic soda by means of lime.

"In the work carried out in a pilot plant No. 1 flake graphite was raised from 90 to 99.2% carbon in quantity, and graphite dust (almost unsalable) was raised from 79.6 to 92.4% carbon (a salable product) in quantity.

"Filtration of the graphite from hot caustic, which was difficult in the laboratory, proved simple on a larger scale, on either vacuum or pressure filters.

"Regeneration of the caustic soda to free it of silica, alumina and iron removed from the graphite was easily accomplished with the pressure filter.

"The total cost, it is estimated, will not exceed 1c per lb. of graphite."

The solution of hot caustic soda serves to dissolve out the silica, alumina and iron content of the concentrate, and sodium silicate, aluminate and ferrite. This solution is separated from the precipitate, which is thoroughly washed and dried. To the solution is added such portion of the wash water as can be economically handled and lime is added and the mass thoroughly agitated. The result of this reaction is a precipitate containing calcium silicate and aluminate together with some iron oxide, and a solution containing caustic soda, which is concentrated for re-use with a fresh batch of graphite concentrate.

It is not believed that this process will in any way replace present methods of mechanical concentration. It is believed, however, that it is possible to remove impurities and raise the carbon content of present concentrates by this process, so that the product will be useful for an increased number of purposes, and will command a higher price.

Buhr mills and sacking bins, Griesemer plant

This method is very effective, and marks an important step in the stabilization of the industry.

Below are given some typical analyses of graphite produced at the Alabama plants:

ANALYSES

Ceylon Graphite Co., Hollins, Coosa county.

Average sample of crushed ore: Carbon, 2.56%.

	Flake No. 1	Flake No. 2	Flake No. 3	Run of mill
Ash	15.04%	12.48%	17.75%	14.00%

Superior Flake Graphite Co., Ashland, Clay county.

Average sample of crushed ore: Carbon, 2.91%.

	No 1+ flake	No. 1 flake	Dust	Run of mill
Ash	8.81%	12.70%	34.52%	9.17%

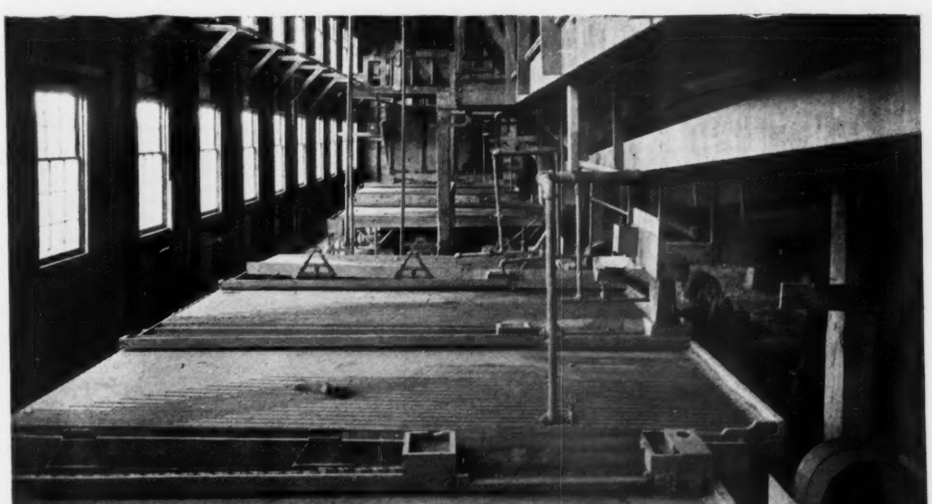
Bama Graphite Co., Mountain Creek, Chilton county.

	Bama grade	Barneco grade	Run of mill
Ash	6.63%	3.70%	25.30%

Joseph Dixon Co.

No. 1 coarse flake, from 1 lb. can.

Ash 9.42%



Flotation machines or concentrating tables in the Griesemer mill

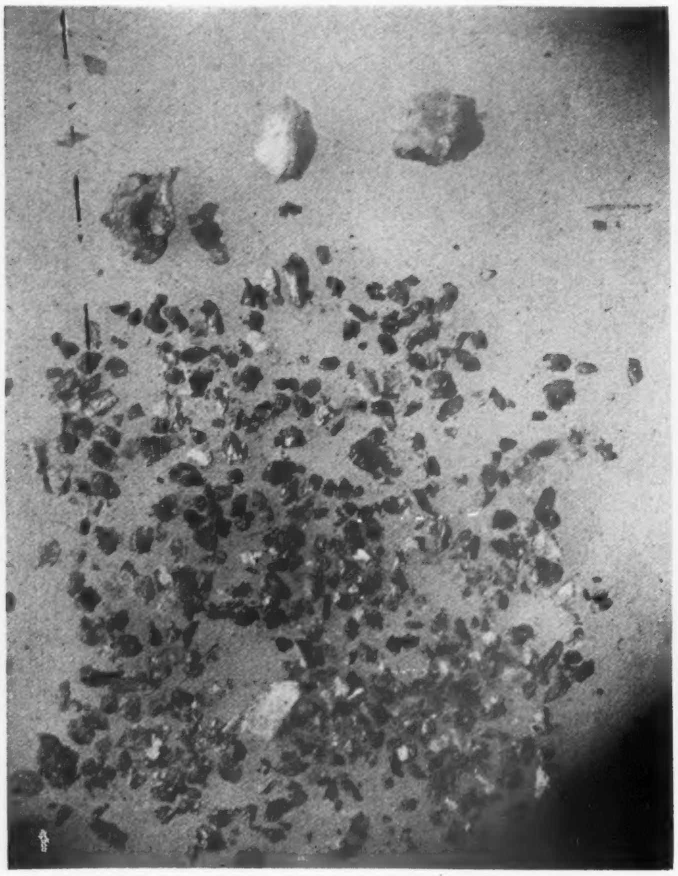
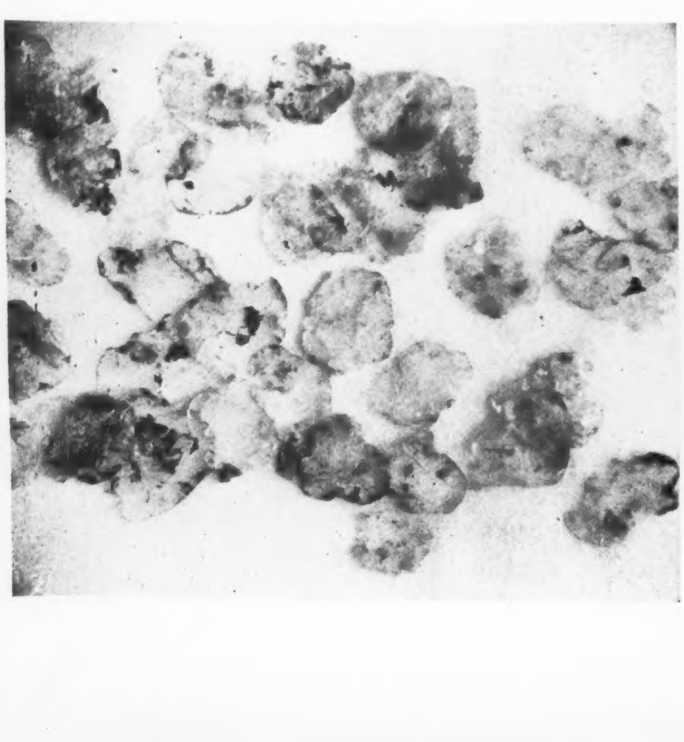


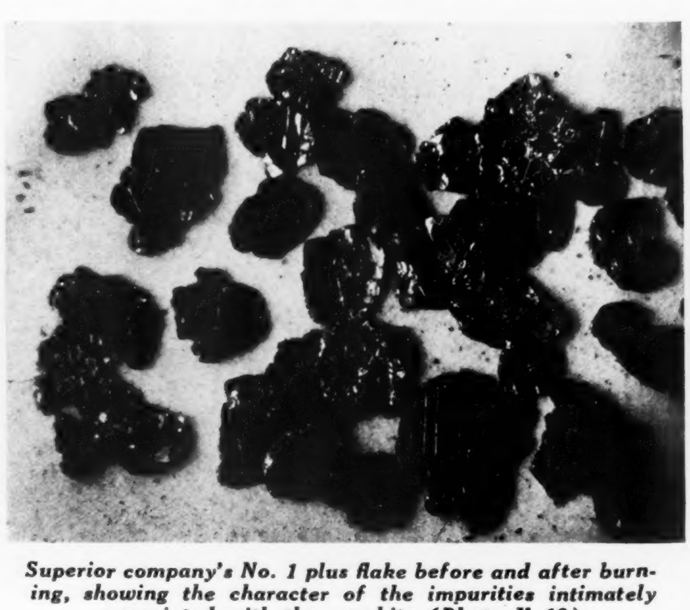
Photo (X 10) showing quartzite and other impurities in a 10-gram sample of (left) Barneco flake from Bama Graphite Co., and (right) from Superior company's No. 1 plus flake

The most surprising thing about the analyses is the extreme variation in the ash in the grades which would seem to be the very best material. For instance, the Superior No. 1 plus flake has a higher ash content than the Barneco flake, which corresponds to a No. 2 flake. The No. 1 plus flake is, as the name signifies, a beautiful, large flake which appears to the eye to be free from grit. Strangely enough, the largest pieces of grit obtained in the separation by heavy liquids came from the No. 1 plus flake. Another astonishing thing came from the Bama Barneco flake. That was the lowest of all in ash content, and carried siliceous grains nearly as large as the No. 1 plus flake. The Bama flake carried large grains of siliceous matter, most of which was quartzite. The impurities in the Ceylon No. 1 flake were comparatively small grains of quartz, but in rather large quantity.

While the size of the grains from the No. 1 plus flake was large, the amount was small and Dr. R. S. Hodges, chemist of the Geological Survey of Alabama, very ingeniously prepared and photographed a few flakes, burned off the carbon and then photographed the ash. This undoubtedly explains why the impurities are so difficult to separate by the flotation methods heretofore employed. The Bama flake was treated the same way and the crucibles used for burning off the carbon from the other samples showed the same properties.

Thus it is found that the ash is in two distinct forms, one as free grains and the





Superior company's No. 1 plus flake before and after burning, showing the character of the impurities intimately associated with the graphite (Photo X 10)

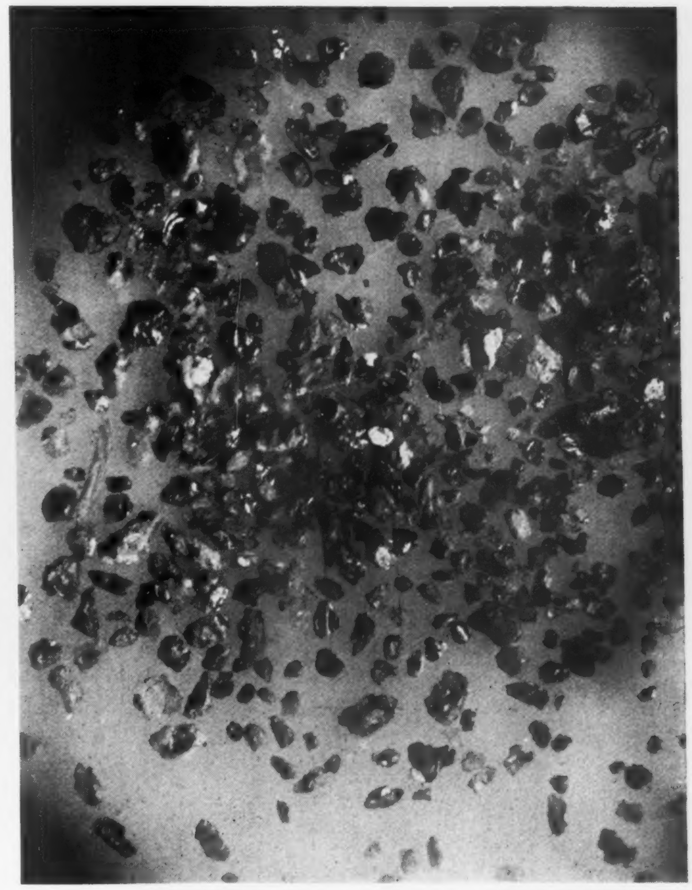


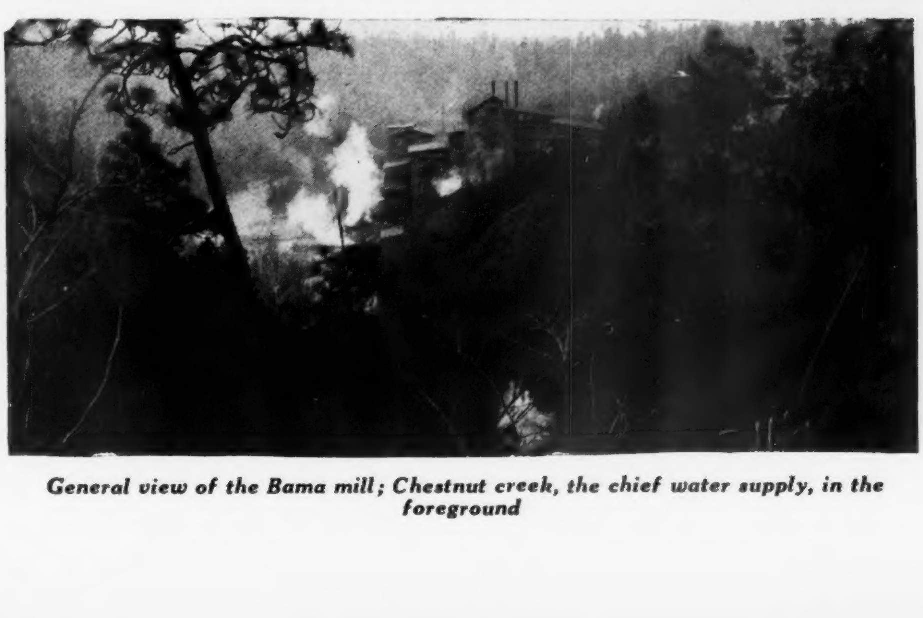
Photo (X 10) showing quartzite and other heavy impurities from 10 grams of Bama flake (left) from Bama company and (right) from No. 1 flake, Southwestern Graphite Co., Ceylon

other intimately associated with the flake, which prompts the conclusion that the percentage of ash is no criterion as to its actual form.

Although it was not directly connected with the problem, Dr. Hodges found the Dixon flake, taken from a 1 lb. can sold in open market, carried the skeletal impurities but had only very small particles of foreign matter. The ash in this flake was 9.42% or about that of the No. 1 plus flake of the Superior plant. Also it is quite significant that the foreign matter was muscovite (white) and biotite (black) mica and not quartz.

A glance at the photomicrographs will show that the impurities are free quartz and mica and quartz so interlaminated as to consist of an integral part of the flake itself. This readily accounts for the difficulty in mechanical separation and favors a chemical method. Incidentally, the Lloyd-Kennedy process is most effective against this intercalated material.

Finishing mill, Griesemer company, located in the Clay county section



General view of the Bama mill; Chestnut creek, the chief water supply, in the foreground

Future Prospects

The progress of the industry, in spite of the burden of inadequate protection and unfair foreign competition, has been satisfactory, and it is likely that a strengthening of classification of imports or possibly a slight revision would result in a return to normal domestic production. The present domestic production of some 5,000,000 lb. of crystalline graphite as compared with about 20,000,000 lb. imported, annually, might be reversed with great benefit to the nation in the way of greatly improved economic conditions in the graphite field.

Hints and Helps for Superintendents

Motor Protection

MOST DREDGING OPERATIONS in the sand and gravel industry are in streams, lakes or ponds where there is not much danger of waves dashing over the deck. Consequently, the motors are only protected by the usual "dog-house," in the event they cannot be mounted inside the deck housing.

The W. D. Haden Co., whose new sand and gravel plant at West Point, Tex., was described in ROCK PRODUCTS, April 12, has a 15-in. Ellicott Machine Co. dredge, and as this company got most of its dredging experience in the recovery of oyster shells off the Gulf Coast, the practice adopted on the gravel dredge naturally was taken from that source.

Armour-protected motor on cutter of dredge

The 75-hp. motor used for operating the dredge cutter is an armour-protected motor of a patented type, and a description of it does not belong in these "Hints and Helps" columns, but the care and expense that the company has gone to to protect the motor from the weather might be a worthwhile suggestion for other operators.

A Difficult Gravel Washing Problem

AT THE OLD PLANT of Gifford-Hill and Co., near Texarkana, Tex., which was recently abandoned for a new plant, built and placed in operation early this spring, the problem of washing clay from the gravel was a serious one, and one that could only be undertaken in a region where good aggregates of any kind are relatively scarce.

The cars, after being loaded at the pit by a Monighan walking dragline, were spotted at the plant where they were dumped to a pit that was kept full of water and which acted as a feeder to the suction of a Pettibone-Mulliken dredge pump. The pump delivered the material to a 36-in. by 20-ft. rotary screen. The oversize, mostly clay balls, was rejected and fell to the ground at the end of the belt conveyor, that can be seen at the end of the building in the accompanying view. The four sizes of aggregate produced by the screen were spouted to ponds alongside the plant. If, in the judgment of the operator, the material was clean, the sand or gravel would be loaded to gondolas or stockpiled by means of a 1¼-yd. Lidgerwood clamshell rig, but, as was often the case, the material had to be rewashed, the same clamshell loaded the material into gondolas which were re-spotted at the track hopper and the material was put through the plant again.

Just before the plant was shut down it was often necessary to run the same material through the plant four times to get a satisfactory aggregate. We doubt very much if there are many producers who would go to this expense and trouble to keep their customers supplied with a clean aggregate until such time as their new deposits can be opened up and their new plants placed in operation.

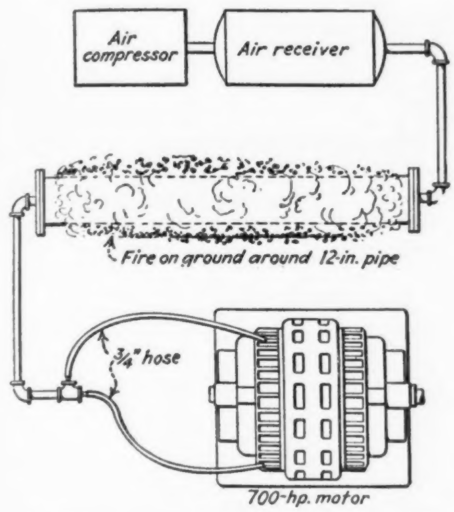
Motor Windings Dried by Hot Compressed Air

MAXIMUM SPEED in drying a motor that has been flooded requires application of the highest heat which the insulation will stand, and a rapid change of air. These two conditions were effectively maintained by a simple arrangement during the early-stage drying of a 700-hp. 2,300-volt hoist motor at Bessie coal mine of the Sloss-Sheffield Steel and Iron Co., Maben, Ala. A. F. Elliott, general master mechanic and chief electrician of the company, has supplied the details to *Coal Age*.

On November 28 an unusually high stage of water in the river flooded the hoist house and the a.c. substation. The

Difficult gravel washing problem solved at old plant of Gifford-Hill and Co. near Texarkana, Texas

water stood 4 ft. deep on the engine-room floor, submerging the main hoist motor and the 14-panel switchboard with the various contactor controls. The outdoor transformers, one a 1,500-kva., 44,000/2,300-volt unit and the other a 600-kva.,



Drying motor windings with hot compressed air

44,000/6,900-volt unit, both three-phase, were nearly half-submerged.

The mine was not affected—that is, the water did not reach the slope portal—so the first problem was to make power available to the main ventilating fan and underground pumps. This was accomplished by running lines direct from the transformer terminals to the overhead lines cutting out entirely the hoisthouse switching apparatus. Rowboats were used by the electricians when stringing these lines, and until the flood receded, the transformers operated by a combination of air-cooling and water-cooling.

In the meantime, plans were made for drying the electrical equipment. As soon as it was out of the water it was washed with a hose to remove the deposit of silt. The windings of the 700-hp. slip-ring motor showed zero insulation resistance, of course, when tested with a Megger. The first stage of drying was effected by directing blasts of hot air around the windings.

For furnishing the air, a 150-cu. ft. compressor was available. As indicated by the accompanying sketch, heating was accomplished by passing the air through a 10-ft. length of 12-in. pipe surrounded by an open fire. The air was directed into the windings at 20-lb. pressure from two nozzles on ¾-in. hose. By keeping the 12-in. pipe at a red heat, the air blast was maintained at about 200 deg. F.

After 20 hours the Megger indicated a degree of insulation resistance warranting a change to drying by electric current. This was applied at 440 volts and the rotor was alternately blocked to provide overhead current for internal heating and then allowed to run free for a time to induce ventilation. After ten hours of this treatment, the insulation showed a resistance of 7 to 8 megohms and the motor was ready for service.

Control magnets, overload trip coils, and other auxiliary apparatus had been removed and dried in a gas-heated bake oven. The oil switches were taken down, cleaned, and filled with dry oil.

Open wiring for power and control lines was used temporarily from motors to switchboard in place of the conduit wiring. After the old wiring had been removed, the conduits were swabbed out. The drying preparatory to installing new wiring was done by blowing heated air through the conduits. This air was supplied by the same equipment that was used in preliminary drying of the motor.

Homemade Slag Feeder

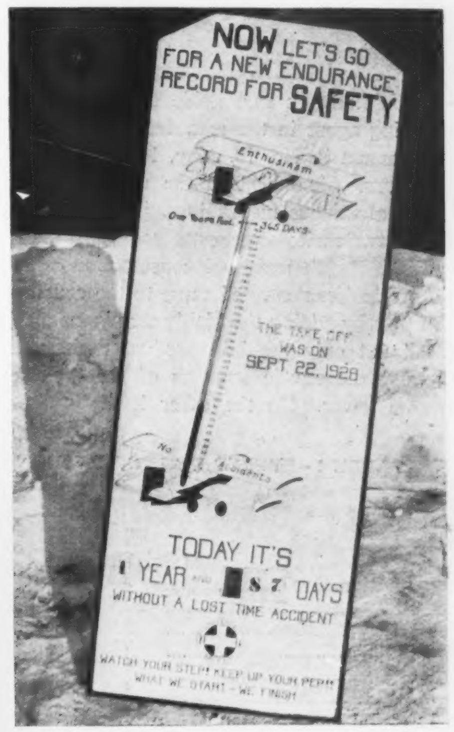
CRUSHED SLAG, or even slag as taken from the pits, is a material that usually flows quite readily and often does not require reciprocating or other mechanical feeders, in the opinion of some operators, to place the material on a belt. Such an instance was found at the central concrete mixing plant (and slag-crushing plant) of the Sloss-Sheffield Steel and Iron Co., Birmingham, Ala.

At that plant the slag from the pits is dumped to track hoppers under which are chutes to a belt conveyor that feeds the Symons cone crusher. The sides of the chutes have been notched as shown in the accompanying view and ¾-in. iron bars have been placed in these notches. The operator removes one or more bars depending on the rate of feed he wants, frequently using one of the bars removed to bar down any chunks. The rate of feed is so rapid that it only takes a few minutes to empty out a standard-gage gondola.

Slag feeder employing chute with iron bars

Novel Bulletin Board for Safety Campaign

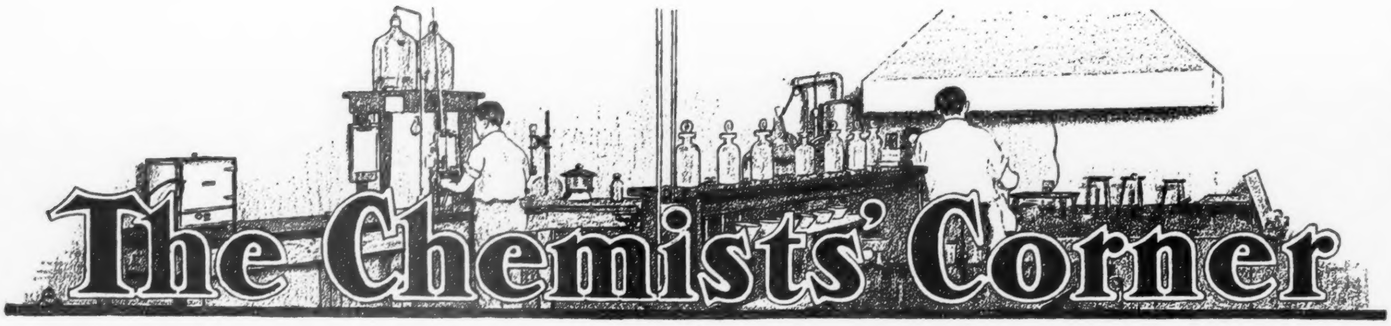
A NUMBER of cement mills taking part in the Portland Cement Association campaign for increased safety are using different methods of compelling the employes' attention to the accident trend at the plant. These have taken different forms and from time to time illustrations of the more unique have been published in ROCK PRODUCTS. But here is one at the plant of the American



Unusual bulletin board attracts attention in safety campaign

Carbolite Co., Inc., Duluth, Minn., which ties up the interest in aeroplane endurance records with "safety" endurance.

Two aeroplanes, "No-Accidents" and "Enthusiasm" are flying as a safety team. They are connected by a long re-fueling line which is a glass tube in which a dark fluid rides day by day to indicate the mounting no-accident record. The tube is graduated alongside into 365 periods, and the dark fluid rises each day as additional fluid is added. In this case the fluid is potassium permanganate solution. The board is placed alongside the time clock and attracts wide attention. The illustration above was published in a recent issue of the *National Safety News*.



Iron Oxide vs. Alumina as a Fluxing Agent in the Manufacture of Portland Cement

By Katsuzo Koyanagi
Chichibu Cement Co., Ltd., Tokyo, Japan

ALTON J. BLANK, Mexico, published his study on iron oxide vs. alumina as a fluxing agent in the manufacture of portland cement in No. 10, May, 1928, of ROCK PRODUCTS. He added to the raw mixture, highly aluminous material vs. iron ore, and burned two series of cements, compared their tensile strength and fuel consumption with the original cement, and came to the conclusion that, by adding the highly aluminous material, not only the kiln product decreased but also the tensile strength of the cement became lower. On the other hand, by increasing the iron oxide content in the raw materials and thereby displacing a part of the alumina content, fuel economy was much promoted, and the cement quality (especially tensile strength) was increased to a very marked and appreciable degree.

The cement which he took originally is high in alumina and comparatively low in silica content. He compared only tensile strength of the cements, gave no data on the compressive strength. From my viewpoint, compressive strength is of no smaller importance than the tensile strength in determination of the cement quality.

We also conducted over an extensive period the study of the same problem, and came to conclusions, a little different from those of Mr. Blank, which we will report in what follows:

EXAMPLE 1—We started from an original cement of the chemical composition as follows:

Ignition loss	0.83%
SiO_2	21.96%
Al_2O_3	5.61%
Fe_2O_3	2.79%
CaO	65.84%
MgO	1.49%
SO_3	1.18%

$$\frac{CaO}{R_2O_3 + SiO_2} = 2.14$$

$$\frac{SiO_2}{R_2O_3} = 2.62$$

$$\frac{Al_2O_3}{Fe_2O_3} = 2.01$$

The cement is low in alumina and high in silica. To the raw materials of this cement we added pyrite sinter of following composition:

Ignition loss	2.69%
SiO_2	6.38%
Al_2O_3	5.73%
Fe_2O_3	83.25%
CaO	0.63%
MgO	0.62%
S	1.56%

The experiment was continued five months, in each month with increased iron oxide content.

The cement was burned with Allis-Chalmers rotary kilns of 10 ft. diameter, 164 ft. length, with powdered coal fuel. The sample of cement was taken every hour at the outlet of grinding mills, and with the mean sample of 24 hours, the strength of the cement was tested.

The comparison of chemical composition, strength, soundness, fuel consumption and kiln product is given in Table 1. All data in Table 1 are the mean values of one month.

TABLE 1—EFFECT OF INCREASING IRON OXIDE IN CEMENT RAW MIX OF HIGH SILICA CONTENT

	No. 1 (Original cement)	No. 2	No. 3	No. 4	No. 5
Chemical Composition					
Ignition loss	0.83%	0.91%	0.94%	1.13%	1.28%
SiO_2	21.96%	21.72%	21.83%	21.41%	20.94%
Al_2O_3	5.61%	5.41%	5.60%	5.46%	5.30%
Fe_2O_3	2.79%	3.41%	3.48%	3.79%	3.93%
CaO	65.84%	65.58%	65.79%	65.84%	65.95%
MgO	1.49%	1.51%	1.35%	1.36%	1.33%
SO_3	1.18%	1.20%	1.07%	1.03%	1.17%
$\frac{CaO}{SiO_2 - R_2O_3}$	2.14	2.12	2.11	2.12	2.14
$\frac{SiO_2}{R_2O_3}$	2.62	2.46	2.41	2.29	2.27
$\frac{R_2O_3}{Fe_2O_3}$	2.01	1.59	1.61	1.44	1.35
Tensile strength kg./cm.²					
3 days	28.5	30.4	29.8	29.1	24.6
7 days	29.2	30.5	30.8	31.0	25.2
28 days	33.7	35.2	35.5	34.2	29.2
Compressive strength kg./cm.²					
3 days	344.9	349.1	327.5	334.4	345.9
7 days	492.1	472.1	438.7	453.9	432.7
28 days	553.1	529.9	507.6	498.4	462.8
Soundness					
Water pat	complete	complete	complete	complete 90%	complete 100%
Boiling pat	complete	complete	complete	complete	unsound
Kiln output, bbl./hour	49.85	48.93	50.25	52.24	55.35
Coal consumption, kg./bbl. (cal. 7300 cal.)	45.80	45.85	47.67	41.23	44.46

We see from the results that the kiln output has remarkably increased and coal consumption decreased a little by making the iron content higher. The tensile strength increased a little within certain range of iron oxide content, but the compressive strength decreased very much. So long as only tensile strength of the cement is concerned, the conclusion of Mr. Blank is true also in our case, but as I stated before, the compressive strength of the cement is of the same importance (at least in Japan and continent) as tensile strength, in the determination of the cement quality; hence, we cannot say that the quality of the cement was improved by increasing the iron oxide content in our case.

When the iron oxide content goes over certain ratio, not only both tensile and compressive strengths decrease, but also the cement becomes 100% unsound in the boiling test.

EXAMPLE 2—To the raw mixture of the cement of approximately same chemical composition as the original cement in Example 1 was now added a highly aluminous clay. The analysis of the highly aluminous clay is as follows:

Ignition loss	15.99%
SiO_2	48.10%
Al_2O_3	24.10%
Fe_2O_3	8.64%
CaO	1.07%
MgO	1.15%

The cements were burned now in a test kiln of 40 mm. by 56 mm. diameter, 7 meters length, with oil firing, as shown in Fig. 1.

The comparison of chemical composition, strength and soundness is given in Table 2.

TABLE 2—EFFECT OF ADDING ALUMINA TO CEMENT RAW MIX OF HIGH SILICA CONTENT

	No. 1 (Orig. cement)	No. 2	No. 3
Ignition loss	1.46%	1.86%	1.06%
SiO_2	22.29%	21.95%	21.23%
Al_2O_3	5.65%	6.21%	6.83%
Fe_2O_3	2.66%	2.50%	2.43%
CaO	65.31%	65.07%	65.20%
MgO	1.17%	1.25%	1.70%
SO_3	1.18%	1.25%	1.13%
$\frac{CaO}{SiO_2+R_2O_3}$	2.13	2.12	2.14
$\frac{SiO_2}{R_2O_3}$	2.65	2.52	2.30
$\frac{Al_2O_3}{Fe_2O_3}$	2.12	2.48	2.81
Tensile strength (1:3 mortar) kg./cm.^{2}			
3 days	28.1	29.2	29.7
7 days	30.3	33.5	34.2
28 days	34.5	40.2	42.2
Compressive strength (1:3 mortar) kg./cm.^{2}			
3 days	367.4	445.6	439.2
7 days	492.4	502.5	523.5
28 days	560.0	596.5	620.0
Soundness			
Water pat	complete	complete	complete
Boiling pat	complete	complete	complete

The fuel consumption could not be determined accurately, but we could see distinctly that cement No. 2 and No. 3 were much easier to burn than cement No. 1. The fuel consumption of cement No. 3 was about 10 to 15% less than that of cement No. 1.

Fig. 1. Mr. Koyanagi standing in front of the laboratory kiln used for the test explained in Example 2

We see from the results of this experiment that both tensile and compressive strengths are increased and also better fuel economy is obtained by making the alumina content of the cement higher. We came in this experiment to the quite opposite conclusions of those of Mr. Blank.

Remarks

From results of our experiment we came to the conclusion that in the case of the cement high in silica and low in alumina content, both iron oxide and alumina can be used as a fluxing agent to obtain a better fuel economy. But from the standpoint of better quality of the cement, alumina is much more advantageous than iron oxide to use as a flux. The high iron oxide content not only makes the strength of the cement low, but also makes the cement remarkably unsound.

From my experience in burning cement, when the cement is high in alumina and low in silica content, iron oxide can be advantageously used as fluxing agent, but when the cement is low in alumina and high in silica, it seems better to increase alumina content a little, leaving the iron oxide content constant.

Dr. G. Haegermann[1] has also shown in his cement formulae the same fact:

$$\frac{SiO_2 \text{ (low)}}{6.75\% - 7.25\%\ Al_2O_3 + Fe_2O_3 \text{ (to be made higher)}}$$

$$\frac{SiO_2 \text{ (high)}}{6.75\% - 7.25\%\ Al_2O_3 + Fe_2O_3 \text{ (to be made low)}}$$

for about the same content of lime.

The cement which Mr. Blank experimented with belongs to the former, and that of my experience to the latter.

Summed up, iron oxide and alumina can both be used advantageously as fluxing agents in cement manufacture. It depends upon the composition of the cement which of these two materials should be chosen.

[1] Dr. G. Haegermann, Ueber Zementformeln. *Zement*, June, 1925.

Gloversville Quarry Changes Hands—To Be Reopened

NEGOTIATIONS are reported concluded between J. L. Sandfordt and Morrell Vrooman of Gloversville, N. Y., with Mrs. Robert S. Anibal, 21 Grand street, for the purchase of the Anibal stone quarry located in the town of Mayfield near the village. It is understood that the deal involved an expenditure of approximately $40,000.

From what could be learned of the deal, the quarry takes in about 89 acres of land just outside the village of Mayfield. The quarry itself is located just off Lakeside drive near the village and easily accessible to the state highway.

Through the transaction the new owners take possession not only of the property but of all the machinery and equipment used to quarry the stone.

In years gone by the quarry has been one of the best located in this section of the state and has furnished large quantities of stone for various road contracts, especially those in Fulton county. It is believed that the new owners will carry on the work even on a much greater scale.

The quarry, one of the oldest in the section, is being partially flooded by the Sacandaga reservoir. The hole where the old workings were located is being abandoned and it is expected that a new one will be opened.—*Gloversville,* (N. Y.) *Herald.*

Editorial Comment

Your 1930 Business; Where Is It Coming From; and How?

What Statistics of Prospective Consumption Are Available and How Can They Be Used?

PROBABLY we would seek long for a better example to illustrate the practical value of statistics of probable consumption than that presented in this year of 1930. Starting in a decided general business slump, with numerous, optimistic, inconsistent, and often unreliable predictions of construction work to come, with a late spring and much unfavorable weather for building, the average producer of construction materials has indeed felt the need of some accurate and reliable measure or guide by which to gage his present season's business.

Such statistics, more or less inadequate, are available in various compilations of building permits and contracts let. Probably the best known of such compilations or services is that of the F. W. Dodge Corp., which maintains a country-wide construction news gathering and reporting organization with district offices in twelve centrally located cities. Of the 48 states in the United States, 37 are thus covered. Subscribers receive "little slips of paper," about 3x6 in., with a description of every piece of construction work, above a certain minimum cost, itemized. These are summarized monthly, by the 12 districts and for the 37 states as a whole. The statistics are analyzed and charted so that the subscriber may have a very fair knowledge of the status of the construction industry in his particular territory and for the country as a whole. These statistics are "contracts awarded," which are generally conceded to be the fairest guide of construction work to be done. This service may be confined to any special type of buildings the subscriber is particularly interested in. There are also numerous other agencies which publish abstracts of building permits and contracts let in local territories, either in the form of weekly or monthly magazines or as mimeographed sheets.

Converting Statistics to Barrels of Cement, Tons of Lime, Etc.

As we suggested in the editorial, Rock Products, December 22, 1928, with which this series of discussions began, it should be entirely possible to analyze such statistics to obtain a fairly accurate percentage figure of the total amount of money spent for construction that may reasonably be expected to be spent for portland cement, for lime, for gypsum, for sand, gravel, crushed stone, etc. This percentage of course varies with the type of building or construction under consideration and undoubtedly to some extent with the practice of local builders, architects and engineers. For example, gypsum plaster is known to be strong in some localities and lime plaster in others; crushed stone in some districts and gravel in others, etc. This percentage in cents per dollar of construction money can be readily translated into barrels of cement, or tons of lime, gypsum, sand, etc., and by an intelligent study of the reports of contracts awarded and the special knowledge of conditions in every locality that producers in those localities should have, there seems to be no reason why the alert producer should not be able to obtain a fairly accurate estimate of the probable demand for his product several months in advance of actual deliveries, or even of orders. It has been determined, we believe, that the average lapse of time between a contract letting and the starting of work, or the delivery of the construction materials, is about five months. But here again the type of building and the locality would have to be studied for the use of producers in the various districts or localities, since the time elapsed may vary in this manner.

When we began this discussion in December, 1928, while of course we were familiar with the *Dodge Reports* and similar services, we did not know that at least one specialist had used them for just such a purpose as we had suggested. This has been done since 1926 by W. S. Mallory, New York, an engineer thoroughly experienced in the portland cement industry, who in his special field renders a service to producers of cement not unlike the service Roger Babson, another engineer, is endeavoring to render business men generally. On the basis of the *Dodge Reports* and his special analysis of them from the angle of a cement expert, Mr. Mallory is able to predict the consumption of cement in each state in which his subscribers are interested, five months in advance, with remarkable accuracy, as a sample of his predictions for the year 1929, made in August, proves. What Mr. Mallory has done for cement producers obviously he, or some one else could do for lime, gypsum, stone and sand producers. Doubtless with adequate directions and encouragement, such a construction

reporting agency as the Dodge organization could give even more comprehensive news service than it has hitherto.

How Much Business Is Producer Entitled To?

Hence, no alert producer need do very much pure guess work on the probable consumption of his commodity in the market territory in which he is interested. His guess work comes in trying to determine how much of it he is entitled to, especially where it is obvious that there is a large surplus of productive capacity in the territory. If prices and conditions are fairly stable and if he is wise and moderately fair-minded, it is probable that his business judgment will tell him that it is both fair and desirable to take whatever percentage of his own capacity the whole business in the territory bears to the whole capacity of the territory. He would be more likely to do this if he knew that all his competitors were equally well informed on the probable consumption. It would seem that ordinary business commonsense would dictate such a course, provided he can once learn by experience that it is more profitable to plan his operation in advance for part capacity production and seek business that under such conditions is really remunerative, than to try to operate to capacity at profitless prices.

Unfortunately, we believe, there is a tendency to look upon such construction news and statistical services, both on the part of the buyer and the seller, as especially valuable *inside* information for the subscriber—to enable him to go out and grab off business that his competitors will not learn about until too late. Such news and statistical service undoubtedly can be so utilized to advantage by the progressive and aggressive producer; but from our point of view it can also be used to greater advantage if subscribed to by all the competitive producers for the purpose of promoting new business, collectively, and to control and budget production and consumption, individually.

Price Agreements Never Win Out in the Long Run

The rub comes when (1) there are one or more producers who will not inform themselves and who operate "by guess and by gosh" regardless of the conditions they must meet and (2) where present prices and profits are such, or are believed to be such, as to invite new competition. These two facts or conditions obviate, and apparently always will obviate, any attempt to maintain stable market conditions for any length of time. Producers in all lines of industry have often attempted to meet them by more or less concealed price agreements. Legal considerations aside, price agreements never succeed on a large scale, or for any length of time. We have many notable examples of this, the most recent being the failure of American copper producers to maintain the price of copper, after a whole year's attempt, although probably no group of producers has ever been better informed of stocks on hand, prices, probable demand, etc. In spite of the availability of accurate statistical guides, with or without possible agreements, producers allowed stocks of copper to accumulate from 88,000 tons in October to 256,000 tons in March.

Such statistics, to be legitimate, must be also available to the consumers as well as to the producers; and, as *always* happens in such cases, the consumers, if they have good judgment and act with any kind of concert, control the situation in the end. It costs money to accumulate and carry stocks, and sooner or later some producer breaks under the strain. In the rock products industry it is, from the nature of things, almost impossible to accumulate enormous stocks, but the same principles apply if the producer has to carry an idle plant, or one that cannot operate at part capacity without a loss.

Neither an individual nor any group of specially interested individuals can long beat the law of supply and demand for a standard, staple commodity. But they can individually and collectively operate their businesses and their industry intelligently. They can and should recognize the fact that no business can in this day continue successfully on guess work and hunches. They can obtain and learn to utilize statistics that give them a fairly accurate gage of prospective consumption. Each producer can, individually, and with his competitors, collectively, study the best methods under the circumstances of increasing the probable consumption. He can individually determine his own best course, which normally, certainly should be to obtain a fair share of the available business at a fair profit. If, in his own best judgment a reduction in the price of the commodity will increase consumption generally, and is justified by present cost of production or prospective savings in cost, ordinary business courtesy, common sense and honor, in these enlightened days, demand that he so inform his competitors. If, in his individual judgment a reduction in price is necessary to discourage unnecessary new promotions, or to weed out high cost or obsolete plants, which in the interests of public economy should be done, business courtesy and honor demand the producer announce his intentions—in other words, that general competitive conditions, or public policy, in his judgment, justify a price reduction.

Avoiding Misunderstanding by Open and Above-Board Methods

So far as we can see there is no violation of the law in such business conduct. And the more open and above board such individual decisions or acts are made the more good will come to the industry both from its members and from the public. Price wars and industrial conflicts are, like other kinds of war, usually the result of misunderstandings and false assumptions. Producers may question the business judgment of another in such instances, but they will not and cannot impugn his motives, honor or integrity. Nearly all the ill-will and unnecessary hazards of an industry come from secrecy and surreptitiousness in the conduct of business. And these eventually react very much to the disadvantage of the entire industry by disorganizing it and by engendering public distrust and ill-will. Really, there is no more reason why producers should hide their business policies, or the reasons for them, than that they should hide their plants and their equipment—and since most rock product producers have been educated beyond the latter kind of concealment, there is hope they will eventually abandon the former.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	5- 6-30	95	99	
Alpha P. C. new com	5- 5-30	30	34	75c qu. Apr. 15
Alpha P. C. pfd	5- 3-30	110	....	1.75 qu. Mar. 15
American Aggregates com.[29]	4-21-30	20	25	75c qu. Mar. 1
Amer. Aggregates 6's, bonds	5- 7-30	85	....	
American Brick Co., sand-lime brick	4-22-30	....	5	25c qu. Feb. 1
American Brick Co. pfd., sand-lime brick	5- 6-30	72	....	50c qu. May 1
Am. L. & S. 1st 7's[29]	4-21-30	96	98	
American Silica Corp. 6½'s[49]	5- 6-30	No market		
Arundel Corp. new com	5- 5-30	44½	45¼	75c qu. Apr. 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	5- 6-30	No market		
Beaver P. C. 1st 7's[29]	5- 2-30	95	98	
Bessemer L. & C. Class A[4]	5- 2-30	30	32	75c qu. May 1
Bessemer L. & C. 1st 6½'s[4]	5- 2-30	85	90	
Bloomington Limestone 6's[29]	4-21-30	83	86	
Boston S. & G. new com.[47]	5- 5-30	16	20	40c qu. Apr. 1
Boston S. G. new 7% pfd.[47]	5- 5-30	46	50	87½c qu. Apr. 1
California Art Tile A	5- 1-30	....	10½	43¾c qu. Mar. 31
California Art Tile B	5- 1-30	....	5	20c qu. Mar. 31
Calaveras Cement 7% pfd.	5- 1-30	86¼	89	1.75 qu. Apr. 15
Calaveras Cement com	5- 1-30	14½	15	
Canada Cement com	5- 5-30	....	18	
Canada Cement pfd	5- 5-30	....	96½	1.62½ qu. Mar. 31
Canada Cement 5½'s[43]	5- 5-30	99¼	100	
Canada Cr. St. Corp. bonds[43]	5- 5-30	96	....	
Certainteed Prod. com	5- 5-30	9¾	10	
Certainteed Prod. pfd	5- 5-30	25	32½	1.75 qu. Jan. 1
Cleveland Quarries	5- 5-30	67	70	75c qu. 25c ex Jun 1
Columbia S. & G. pfd	5- 5-30	94½	100	
Consol. Cement 1st 6½'s, A	5- 6-30	70	80	
Consol. Cement 6½% notes[24]	5- 6-30	75	80	
Consol. Cement pfd.[29]	4-21-30	50	60	
Consol. Oka S. & G. 6½'s[12] (Canada)	5- 2-30	100	101	
Consol. Rock Prod. com.[44]	5- 1-30	2	2½	
Consol. Rock Prod. pfd.[44]	5- 1-30	10	12	
Consol. Rock Prod. units	5- 5-30	23	25	
Consol. S. & G. com. (Can.)[38]	2- 8-30	No market		
Consol. S. & G. pfd. (Can.)	5- 5-30	82	85	1.75 qu. May 15
Construction Mat. com	5- 6-30	21½	21⅝	
Construction Mat. pfd	5- 6-30	46⅛	46¼	87½c qu. May 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	5- 1-30	90	98	
Coosa P. C. 1st 6's[29]	5- 6-30	50	55	
Coplay Cem. Mfg. 1st 6's[40]	5- 5-30	90	....	
Coplay Cem. Mfg. com.[40]	5- 5-30	10	....	
Coplay Cem. Mfg. pfd.[40]	5- 5-30	70	....	
Dewey P. C. 6's (1942)	5- 6-30	98	....	
Dewey P. C. 6's (1930)	5- 6-30	98	....	
Dewey P. C. 6's (1931-41)	5- 6-30	98	....	
Dolese & Shepard	5- 5-30	84	87	$2 qu. Apr. 1
Edison P. C. com.[39]	5- 2-30	10c	....	
Edison P. C. pfd.[39]	5- 2-30	25c	....	
Giant P. C. com.[2]	5- 5-30	5	12	
Giant P. C. pfd.[2]	5- 5-30	25	30	
Gyp. Lime & Alabastine, Ltd.	5- 5-30	22¾	23	37½c qu. Apr. 1
Hermitage Cement com.[11]	5- 5-30	30	35	
Hermitage Cement pfd.[11]	5- 5-30	80	90	
Ideal Cement, new com	5- 5-30	55	58	75c qu. Apr. 1
Ideal Cement 5's, 1943[33]	4-21-30	97	100	
Indiana Limestone com.[29]	4-21-30	3	5	
Indiana Limestone pfd.[29]	4- 7-30	No market		1¾% qu. June 1
Indiana Limestone 6's	5- 5-30	85	....	
International Cem. com	5- 5-30	65	67	$1 qu. Mar. 28
International Cem. bonds 5's	5- 5-30	98½	100	Semi-ann. int.
Iron City S. & G. bonds 6's	4-21-30	95	....	
Kelley Is. L. & T. new st'k	5- 5-30	40	44½	62½c qu. Apr. 1
Ky. Cons. St. com. V. T. C.[48]	5- 1-30	9	11	
Ky. Cons. Stone 6½'s[48]	5- 1-30	94	98	
Ky. Cons. Stone pfd.[48]	5- 1-30	87½	90	1.75 qu. May 1
Ky. Cons. Stone com.[48]	5- 1-30	9	11	
Ky. Rock Asphalt com.[11]	5- 5-30	15	17	40c qu. Apr. 1
Ky. Rock Asphalt pfd.[11]	5- 5-30	85	90	1.75 qu. Mar. 1
Ky. Rock Asphalt 6½'s[11]	5- 5-30	95	100	
Lawrence P. C.	5- 3-30	61	66	$1 qu. Mar. 29
Lawrence P. C. 5½'s, 1942	4- 2-30	83	....	
Lehigh P. C.	5- 3-30	38	40	62½c qu. May 1
Lehigh P. C. pfd	5- 3-30	107⅝	108	1¾% qu. Apr. 1

Stock	Date	Bid	Asked	Dividend
Louisville Cement	5- 1-30	230	....	
Lyman-Richey 1st 6's, 1932[13]	5- 5-30	97	99	
Lyman-Richey 1st 6's, 1935[13]	5- 5-30	97	99	
Marblehead Lime 6's[14]	5- 5-30	94	98	
Marbelite Corp. com	5- 2-30	310	....	
Marbelite Corp. pfd	5- 2-30	12½	....	50c qu. Apr. 10
Material Service Corp	5- 6-30	22⅛	....	50c qu. Mar. 1
Medusa Portland Cem	4-22-30	100	100½	1.50 Apr. 1
Mich. L. & C. com.[6]	5- 5-30	15	17	
Missouri P. C.	5- 5-30	30	31	50c qu. May 1
Monolith Portland Midwest[9]	5- 1-30	2½	3	
Monolith bonds, 6's[9]	5- 1-30	85½	87½	
Monolith P. C. com.[9]	5- 1-30	3½	5	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	5- 1-30	5	6	40c s.-a. Jan. 1
Monolith P. C. units[9]	5- 1-30	13½	16	
National Cem. (Can.) 1st 7's[43]	5- 5-30	99½	....	
National Gypsum A com	5- 5-30	7	8	
National Gypsum pfd	5- 5-30	37	39	
Nazareth Cement com.[26]	5- 5-30	24	....	
Nazareth Cement pfd.[26]	5- 5-30	95	....	
Newaygo P. C. 1st 6½'s[29]	4-21-30	101½	102½	
New Eng. Lime 1st 6's[14]	5- 5-30	90	95	
N. Y. Trap Rock 1st 6's	5- 5-30	99¾	....	
N. Y. Trap Rock 7% pfd.[30]	5- 5-30	95	....	1.75 qu. Apr. 1
North Amer. Cem. 1st 6½'s	5- 5-30	63¾	64¼	
North Amer. Cem. com.[29]	4-21-30	2	4	
North Amer. Cem. 7% pfd.[29]	4-21-30	20	24	
North Amer. Cem. units[29]	4-21-30	22	25	
North Shore Mat. 1st 5's[15]	5- 6-30	98	....	
Northwestern States P. C.[37]	5- 5-30	110	115	$2 Apr. 1
Ohio River Sand com	4-21-30	....	18	
Ohio River Sand 7% pfd	4-21-30	99	102	
Ohio River S. & G. 6's[16]	5- 5-30	85	95	
Oregon P. C. com.[9]	5- 1-30	13	16	
Oregon P. C. pfd.[9]	5- 1-30	95	100	
Pacific Coast Aggregates pfd.	5- 5-30	10	15	
Pacific Coast Cement 6's[5]	3-20-30	80	85	
Pacific P. C. com	5- 1-30	26	27	
Pacific P. C., new pfd	5- 1-30	75	80	1.62½ qu. Apr. 5
Pacific P. C. 6's	4-17-30	99½	100¼	
Peerless Cement com.[21]	5- 5-30	8	10	
Peerless Cement pfd.[21]	5- 5-30	80	85	1.75 Apr. 1
Penn.-Dixie Cement pfd	5- 5-30	45½	49	
Penn.-Dixie Cement com	5- 5-30	8	9	
Penn.-Dixie Cement 6's	5- 5-30	82½	85	
Penn. Glass Sand Corp. 6's	4- 2-30	101½	103	
Penn. Glass Sand pfd	4- 2-30	100	....	1.75 qu. Apr. 1
Petoskey P. C.	5- 2-30	9	....	15c qu. Apr. 1
Port Stockton Cem. units[9]	2-17-30	....	30	
Port Stockton Cem. com.[9]	5- 1-30	No market		
Riverside Cement com	5- 1-30	12	15	
Riverside Cement pfd.[9]	5- 1-30	78	82	1.50 qu. May 1
Riverside Cement, A[20]	5- 2-30	10½	12½	31¼c Feb. 1
Riverside Cement, B[9]	5- 1-30	4	5	
Roquemore Gravel 6½'s[17]	5- 5-30	99	100	
Santa Cruz P. C. 1st 6's, 1945[5]	3-20-30	105¾	....	6% annually
Santa Cruz P. C. com	5- 1-30	91	....	$1 qu. Apr. 1
Schumacher Wallboard com	5- 1-30	11¾	13¾	
Schumacher Wallboard pfd	5- 1-30	23½	25	50c qu. Feb. 15
Southwestern P. C. units[44]	5- 1-30	275	....	
Standard Paving & Mat. (Can.) com	5- 5-30	22½	22⅞	50c qu. May 15
Standard Paving & Mat. pfd.	5- 5-30	....	84¾	1.75 qu. Feb. 15
Superior P. C., A	5- 1-30	39	42	27½c mo. May 1
Superior P. C., B	5- 1-30	12	13	25c qu. Mar. 20
Trinity P. C. units[37]	5- 5-30	120	130	
Trinity P. C. com.[37]	5- 5-30	40	....	
Trinity P. C. pfd.[29]	4-21-30	100	110	
U. S. Gypsum com	5- 5-30	49½	50	40c qu. Mar. 31
U. S. Gypsum pfd	5- 5-30	116½	117	1.75 qu. Mar. 31
Universal G. & L. com.[3]	5- 6-30	....	50c	
Universal G. & L. pfd.[3]	5- 6-30	5	10	
Universal G. & L., V. T. C.[3]	5- 6-30	No market		
Universal G. & L. 1st 6's[3]	5- 6-30	No market		
Warner Co. com.[16]	5- 5-30	45	48	50c qu. Apr. 15
Warner Co. 1st 7% pfd.[16]	5- 5-30	104	106	1.75 qu. Apr. 1
Warner Co. 1st 6's	5- 6-30	99½	100	
Whitehall Cem. Mfg. com.[36]	5- 5-30	40	....	
Whitehall Cem. Mfg. pfd.[36]	5- 5-30	48	....	
Wisconsin L. & C. 1st 6's[15]	5- 6-30	95	....	
Wolverine P. C. com	5- 6-30	4½	5	15c qu. May 15
Yosemite P. C., A com.[9]	5- 1-30	2¾	3¼	

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Beadling & Co., Youngstown, Ohio. [5]Freeman, Smith & Camp Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simons & Co., Inc., Detroit, Mich. [22]Hemphill, Noyes & Co., New York, N. Y. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick & Co., Montreal, Quebec. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co.. Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Atlantic Gypsum Products Co. 6's, 1941, $4,000 and 40 shs. com.[1]	35%	....
Atlantic Gypsum Products 6's, 1941, $5,000; 50 shs. com. as bonus[3]	49%	....
Consolidated Cem. com. v.t.c., 3220 shs.[1]	1½ per share	....
Indiana Limestone deb. 7's, 1936, with warrants ($1,000)[4]	$500 for the lot	....
Universal Gypsum com. trust ctfs., 800 shs.[2] (no par)	$5 for the lot	....
Universal Gypsum com., 300 shs.[2] (no par)	$6 for the lot	....

[1]Price at auction by Wise, Hobbs & Arnold, Boston, Dec. 18, 1929. [2]Price at auction by Adrian H. Muller & Son, New York, Dec. 18, 1929. [3]Price at auction by R. L. Day & Co., Boston, Dec. 18, 1929. [4]Price at auction by Adrian H. Muller & Son, Dec. 26, 1929.

Asbestos Corporation's Financial Statement and Outlook

ALTHOUGH new management of Asbestos Corp., Ltd., Montreal, Que., has had difficulties to overcome in re-establishing earnings power of company on a satisfactory basis, Col. R. F. Massie, new president, states the directors hope to bring up income to a proper level again without recourse to reorganization, according to a news item in the *Wall Street Journal* (New York) which continues:

Report for year ended December 31, 1929, shows net income of $18,338, equal to 25 cents a share on 74,564 shares outstanding $100 par preferred stock. This amount was carried forward to surplus. In 1928, net income was reported at $250,159, equal to $3.35 a preferred share. After payment of $521,927 in preferred dividends in that year there was a deficit for the year, exclusive of $187,500 profit received in the sale of Etchemin Power Co. stock, of $271,768. Incidentally, the amount received in 1928 in Etchemin Power transaction, as well as amount due January 1, 1929, were both included in 1928 report.

Actually company had a better year in 1929 than in 1928, with sales $269,488 in excess of preceding year. To make a proper comparison, according to Colonel Massie, there should be added to 1929 profits $106,569 for inventory, had this been valued on same basis as in preceding year; also a sum of $108,832 for additional stripping charges, as compared with previous year. Another factor to be considered is that $300,000 was charged off for depreciation in 1929 against $200,000 in 1928.

Balance sheet also reflects more conservative accounting policy of the new management, which took office on May 22, 1929. Sum of $2,151,182, being the appraised value, less estimated salvage return, of certain silent and obsolete plants and buildings was written off. Also, $769,184, representing amount expended in years 1927, 1928 and 1929 for stripping, drilling and developing and not absorbed into operating costs, part of which appeared in 1928 balance sheet as an asset, has been written off. Since the total of the two write-offs from surplus account amounts to $2,920,366, while surplus at the end of 1928 was carried at only $294,159 and at the end of 1929 at $148,137, it was necessary to deduct $2,756,010 from the valuation of 200,000 shares no-par common stock after expending the 1929 net of $18,333 which was carried forward to surplus. The valuation of the common stock was thus reduced to $5,000,000.

Among assets, property valuation has been cut to $19,300,616 from $21,807,865 at end of 1928, deferred charges are $168,064, against $70,505, investments $650,672, against $842,266, inventories $933,930, against $1,041,335, receivables $497,082, against $342,272 and cash $42,939, against $74,375.

Among liabilities, funded debt is $7,634,142 against $7,728,642. Reserves are $155,841 against $179,899, bank loans $800,000 against $300,000, payables $407,939 against $343,021 and accrued liabilities $22,469 against $16,841. An item in the 1928 balance sheet, $130,481 dividends due, does not appear in 1929 statement.

Total assets amount to $21,624,931, against $24,205,466 at end of 1928. Current assets total $2,124,635, against current liabilities of $1,230,409, giving working capital of $894,226, compared with $1,509,896 year before.

Statement of directors, accompanying annual report, severely criticizes preceding management, stating:

"Corporation has been suffering and the present board has been handicapped as result of policy of former management, which led to depletion of accessible ore bodies tributory to the various mills—apparently without consideration of the advisability of rendering available in each year an amount of asbestos-bearing ore equal to that which the year's operation had exhausted; a policy which led to capital and other expenditures from which immediate benefits could not be enjoyed, and in some cases, which meant a complete loss to the corporation.

"In fact, contracts let during the year 1928 and the early part of 1929 and in connection with which large sums had been expended prior to the last annual meeting, which contracts the present board had no alternative but to carry through, resulted in a complete loss and contributed substantially to the reduction in liquid surplus as shown in balance sheet of December 31, 1929, over December 31, 1928."

The directors' statement discusses outlook for company as follows:

"Corporation controls approximately 30,000 acres in districts, which, as a matter of record, are known to have asbestos-bearing areas containing asbestos equal in quality to the best produced and without a superior anywhere, and it seems reasonable to assume that the exploration work now being carried on in a conservative manner should reveal deposits of asbestos of equal quality to that now in evidence."

That company is not yet entirely out of difficulty is indicated in report just issued by Dominion Bureau of Statistics on January exports of asbestos out of Canada. Total of 6658 tons of asbestos valued at $463,341 was shipped in that month, compared with 8243 tons, valued at $560,503, in January of last year, and 11,614 tons, valued at $778,505, in December, 1929.

Recent Dividends Announced

American Brick pfd. (qu.)	$0.50	May 1
Cleveland Quarries (qu.)	0.75	June 1
Cleveland Quarries extra	0.25	June 1
Consol. Sand and Gravel pfd. (qu.) (Can.)	1.75	May 15
Indiana Limestone pfd. (qu.)	1¾%	June 1
Standard Pav. and Mat. com. (qu.) (Can.)	0.50	May 15
Wolverine P. C. (qu.)	0.15	May 15

Bessemer Limestone and Cement Co.'s Report

THE Bessemer Limestone and Cement Co., Youngstown, Ohio, reports for the year ended December 31 net income of $393,683 after charges, equal after allowing for regular class "A" dividends to $2.43 a share on the 100,000 no par class "B" shares outstanding. This compares with $543,201 or $3.62 a share on the 50,000 class "A" and to $3.62 a share on the 100,000 class "B" shares outstanding in the preceding year.

Class "A" stock is entitled to receive $3 per share per annum, then participates share for share with class "B" stock after the latter receives $3 per share per annum.

The company reported net earnings of $341,683.37 for 1929 after federal taxes, depreciation, depletion and bond interest had been charged off, compared with $543,201.84 in 1928.

Earnings in 1929 were $523,777.22 after bond interest, but before providing for depletion, depreciation and federal taxes.

Dividends of $3 a share were paid on 50,000 shares of class "A" stock and $1 a share was paid on 100,000 shares of class "B" stock.

"Your company's earnings declined to some extent in 1929, as compared with preceding year," President Beeghly reported, "and this was the experience generally in the cement industry.

"The demand for cement was considerably less, due principally to the declines in building construction. Such a large proportion of the available money of the country was tied up in the stock market that it was impossible to finance new building construction. Notwithstanding these unfavorable conditions, your company's earnings were fairly good.

"Prospects for the year 1930 are quite good and the indications are that we will do a larger business than in 1929. Improvements have been made in the cement manufacturing plant which will increase output and reduce costs.

"Additional limestone land has been purchased and a new quarry has been opened which is furnishing a better quality of limestone and at a lower production cost than in previous years. Selling prices for cement have recovered a considerable part of the reductions which were made during 1929."

California Art Tile Earnings

THE California Art Tile Corp., San Francisco, Calif., a concrete products manufacturer, earned a net of $10,529 in the first quarter of its fiscal year, ended December 31, 1929. The company's year ends September 30. Dividends of $9,944 were paid from earnings in the first quarter and the balance was added to surplus, which totaled $23,826 as of December 31.

Total current assets amounted to $196,356 and current liabilities to $17,682, at the end

of the company's first quarter, as compared with current assets of $210,773 and current liabilities of $23,022 at the end of the last fiscal year. Total assets declined $15,830 during the quarter ended December 31, 1929, but showed an increase of $10,874 over the total, as of September 30, 1928.

Balance sheets, as of December 31, 1929, September 30, 1929, and September 30, 1928, when the present corporation was formed, compare as follows:

ASSETS	Dec. 31, 1929	Sept. 30 1929	Sept. 30 1928
Cash	$26,721	$ 5,100	$57,909
Accounts and notes receivable less reserve	45,763	59,006	65,050
Inventories	109,763	106,666	78,923
Marketable stocks	15,107	....	....
Total current	$196,356	$210,773	$201,883
Fixed assets less depreciation	178,805	180,527	165,302
Other assets	90,259	89,950	87,361
Total assets	$465,421	$481,251	$454,547
LIABILITIES			
Total current	$17,682	$23,022	$19,559
Reserve for taxes	1,710	....	....
Capital stock	422,202	434,988	434,988
Surplus	23,826	23,240	....
Total liabilities	$465,421	$481,251	$454,547

Balance Sheet of the Pennsylvania Glass Sand Corp.

THE BALANCE SHEET of the Pennsylvania Glass Sand Corp., Lewistown, Penn., as of December 31, 1929, is reported as follows:

ASSETS	1929	1928
Property, equipment, minerals, etc.	$14,750,633	$14,477,972
Current assets:		
Cash	280,283	219,888
Accounts receivable	533,960	339,270
Inventories	134,524	270,895
Deferred accounts	420,859	491,312
Investments	459,840	236,828
Total	$16,636,312	$16,036,165
LIABILITIES		
Capital stock and capital surplus	$9,046,040	*$9,089,340
Earned surplus	6,515,792	1,288,186
Bonded debt	4,801,000	4,903,501
Current liabilities:		
Accounts payable	254,230	115,982
Accrued accounts	63,274	2,936
Interest and preferred dividend payable	189,182	....
Other reserves	766,794	636,220
Total	$16,636,312	$16,036,165
Current assets	$948,767	$830,053
Current liabilities	317,504	118,918
Working capital	$631,263	$711,135

*Represented by 30,000 preferred and 300,000 common no par shares.

Arundel Corporation Earnings

THE net profit of the Arundel Corp., sand and gravel producers and dredging contractors, Baltimore, Md., in January broke all previous records for that month, amounting to $132,897 against $127,000 in January, 1929, the most profitable January up to that time.

Current assets at the end of January amounted to $4,837,461, against current liabilities of $744,183, a ratio of more than 6½ to 1. Included in current assets were $469,299 cash and $415,810 marketable securities.

Last year the Arundel Corp. bought $850,000 plant equipment and at the close of January only $258,000 remained unpaid. All the payments were out of earnings.

Quarry Company Sued for $15,000 Royalty

THE East St. Louis Stone Co. has filed suit for $15,000 royalty alleged to be due on a lease of quarry property in St. Clair county, Illinois, which is demised to the Illinois Electric Limestone Co., a Delaware corporation. The declaration recites that the lease was executed in 1927 for a period of six years.

The quarry company was to pay an annual rental of $25,000 and a royalty of 10 cents a ton on all rock cut above 250,000 tons. It is charged that 125,000 additional tons have been quarried since June, 1929, for which no accounting or payment of royalty has been made. The lease was executed between Ralph E. McLean, president of the East St. Louis Stone Co., and R. Morrison, Jr., vice-president of the Illinois Electric Limestone Co. The suit was filed in the federal court at East St. Louis.—*St. Louis (Mo.) Globe-Democrat.*

Cutler-Hammer Purchases Motor Control Co.

ANNOUNCEMENT is made by Cutler-Hammer, Inc., Milwaukee, Wis., that it has purchased the assets of Union Electric Manufacturing Co., also of Milwaukee, manufacturers of motor control, specializing in a line of drum type control apparatus.

The branch sales offices and warehouse stocks of Union will be consolidated immediately with the Cutler-Hammer branch offices and warehouses, and the present factory will be operated as a manufacturing division of Cutler-Hammer. E. F. Le Noir, president of Union, will become a member of the headquarters sales staff of Cutler-Hammer, and most of the company's personnel, particularly those in the sales and engineering departments, will also join the Cutler-Hammer organization.

Weston and Brooker Co. Plans Expansion

THE WESTON AND BROOKER CO., Columbia, S. C., has announced that it will build a large crushed granite plant at Camak, Ga., the work to be completed by September 1. It will be modern steel and concrete, the latest design with many new features. It will have an ultimate capacity of 60 cars per day and a storage capacity of 80,000 tons.

The company last year purchased quarries at Holton, Ga., near Macon, and while no announcement has been made about this property, the company expects to develop it when conditions warrant the move.

The company also owns other quarry property in Georgia, and operates two plants in South Carolina—one at Columbia, which has been in operation 20 years—and one near Edgefield, known as the Parkhill plant.—*Augusta (Ga.) Chronicle.*

West Virginia Lime Manufacturer Expands

THE R. N. HORTON LIME CO., located one mile east of Richlands, W. Va., after running full blast for six months, has closed down in order to build larger kilns and grade out and build a large storage room. The demand for the lime was so great that only a portion of orders could be filled. The company plans to build a storage room to hold several hundred tons of lime and build two large kilns, then operate the kilns twelve months out of the year. Mr. Horton tried out a small kiln last year, and this year built a larger kiln. It was learned the lime he manufactured was fine for agricultural purposes and ranked high for plaster lime. One man tried out the lime on a potato patch and the result was wonderful, as he had been raising only four or five bushels before last year, but when he dug his potatoes last year he had twenty bushels of nice, large sized potatoes.—*Blufield (W. Va.) Telegraph.*

Former Highway Employes Embark in the Gravel Business

CLARENCE BROOKS AND RALPH LARIMER, former county highway employes, have constructed a gravel plant at the bank on the McCarty farm, two miles west of Logan, Ohio, where they are preparing gravel for road construction purposes.

The new plant, which was installed during the last week, has a capacity of 150 cu. yd. daily, it is reported.

Mr. Brooks for the last ten years has been employed in the road forces as a foreman but now will devote his entire time to the operation of the new plant. Mr. Larimer, who has been employed in the office of the county surveyor for the last two years, is associated with him.

The gravel found in the McCarty bank is said to compare favorably with that which is shipped from other parts of Ohio.—*Athens (Ohio) Messenger.*

Hermitage Portland Cement Bonds Called

ALL of the outstanding bonds, dated May 1, 1924, of the Hermitage Portland Cement Co., Nashville, Tenn., were called for payment on May 1 at par and interest at the Fourth and First National Bank, trustees, Nashville, Tenn.

Tunnel Blast at Monocacy Quarry of the J. T. Dyer Quarry Co.

Blasting in Old Birdsboro Quarry Is News Reel Feature

E. T. Wolf standing over the blasting machine, ready for the big moment. The gentleman in the background is Mr. Wolf, Sr. Superintendent Kelly, with arms folded, is enjoying the proceedings

THERE are few incidents in everyday quarry life that appeal to the public imagination, but the explosion of a large quantity of dynamite does. Tons of dynamite exploding in quarries is a daily occurrence, yet the circumstances surrounding such shots are not always such that the public in general ever finds notice of the events in the daily news reels and newspaper columns. An exception was at the Monocacy quarry of the John T. Dyer Quarry Co., near Birdsboro, Penn., where on April 30 an unusual shot was fired, technically speaking; and unusual also on account of the wide array of moving picture companies which had their field photographers there in force to record the event for the "talkie" fans. The quarry is roughly 60 miles from Philadelphia, making it possible for all the news reel agencies to be there, and they were; one could hardly walk around the southerly run of the quarry without tripping over wires leading from microphones to the recording instruments.

The Fox-Hearst Corp., Pathé and Paramount News Service companies took four different types of pictures; silent pictures, sound pictures, slow motion pictures and "reverse" pictures of the blast, and at least seven other more or less local motion picture news agencies took silent pictures of the shot; so it will be very doubtful if one attending a "movie" show within the next few weeks fails "seeing" this shot—not as it actually was, exactly, but as the movies recorded the event.

The shot was scheduled to take place at exactly 12 o'clock, noon, April 30, a few minutes prior to which time a whistle warned all to leave the quarry. At noon a shot from a gun notified the picture operators that in 15 seconds the switch would be thrown. It was a signal for all to start "shooting" the scene. Someone made a remark about it "being her big moment," a remark that was immediately repeated into the "mike." Just then the blast went off and it was.

After the smoke and dust had subsided, one group of photographers prevailed upon F. T. Gucker, president of the John T. Dyer Quarry Co., to act as star in a few preliminaries including broadcasting into the "mike," operating the plunger of a blasting machine and supervising the "loading of the last hole"—a bit of "hokum" for the benefit of the unseen audience, as by the time the photographic work was completed, the actual shot had been history for two or three hours.

While Mr. Gucker was with the Pathé photographers, P. J. Kimball, manager of the New York office of the E. I. du Pont

At left, John W. Koster of the du Pont technical department, preparing to lower the last charge. At right, P. J. Kimball, New York manager for duPont, broadcasting. Superintendent Kelly looks on

Showing how pawder and stemming were lowered

Loading the basket with dynamite for the tunnels

Loading overburden for tamping coyote holes

Stripping for stemming being lowered over the rim

President Gucker broadcasting

Van containing recording equipment

At left, a reverse picture camera; center, a silent machine, and, right, slow motion camera

The empty basket returning for a load of powder

Some of the powder used in the shot

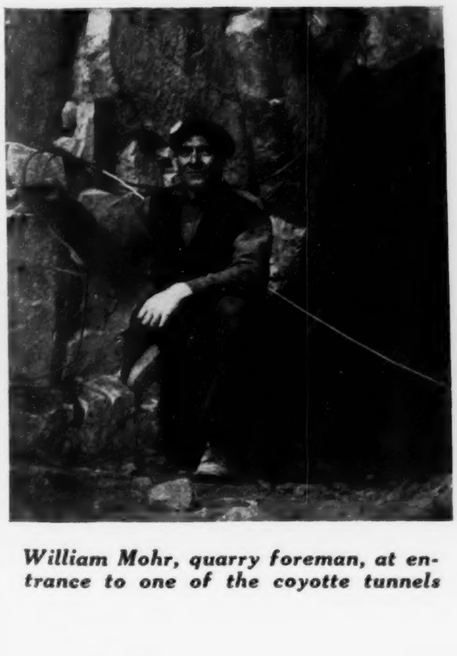
Views of the face after the shot. In the lower right-hand corner can be seen one of the coyote tunnels which will be shot later

de Nemours and Co., was on another "location," going through the same procedure, broadcasting, loading the "last hole" and operating the blasting machine for the Fox-Hearst movie cameras. In reality, the shot was fired by some unknown quarry operator by merely closing a switch in the power house. While "comparisons are odious" as to which lot had the better group of actors, it is believed no one's feelings will be hurt if it is said half seriously that in loading "the last hole," the du Pont men had the finer technique, as after a brief talk by John W. Koster of the technical division, he very carefully and solemnly lowered a 7-in. by 24-in. stick of dynamite into an empty 50-gal. oil barrel, while the rivals simply hid their 50-lb. charge behind a convenient rock. Unquestionably, when the final shots are shown it will look like the real thing either way, to the uninitiated. As an operator of the blasting machine, however, Mr. Gucker showed the greater talent. E. T. Wolf, who played that role for Fox-Hearst, forgot to look at the quarry at the instant the shot went off, so he had to repeat. His remarks, we hope, were duly recorded into the "mike."

The rock is a tough trap rock and previous blasting practice had been to use well-drill holes. Last year at this same quarry the largest blast ever made in a stone quarry, a blast that totaled 86 tons of dynamite and yielded 1,100,000 tons of stone, was made. In this shot described here the coyote or tunnel blasting method was used, but in a different manner than is ordinarily the case.

The quarry face at its maximum has a height of 310 ft. and at that part which was shot down on April 30, the average height was about 270 ft. As the "lift" would be too great on such a high face, to shoot it from bottom tunnels, two coyote tunnels were driven about half way between the

The dark spot shows the entrance to one of the coyote tunnels



William Mohr, quarry foreman, at entrance to one of the coyotte tunnels

It took a stiff climb, assisted by a rope, to reach the coyote holes

One of the movie operators getting "set." Mr. Gucker is at the left

quarry floor and the quarry rim. At the higher part of the face, a single 8-in. well-drill hole was loaded and shot along with the two coyote holes.

These two tunnels were spaced a distance of roughly 150 ft. and driven into the face a distance of 50 ft. Cross drifts were run at right angles from the main tunnel, as shown in the accompanying sketch. The holes were loaded with 7-in. by 24-in. du Pont 40% dynamite with the charges arranged in the cross tunnels as shown. No stemming was used in the cross tunnels between charges, but at the junction of the main tunnel and cross tunnel, powder boxes filled with stripping were first piled to the roof to act as a bulk head after which the balance of the tunnel was filled to the entrance with earth stemming. The charges were connected up with 470 ft. of double counter Cordeau Bickford detonating fuse and 500 ft. of No. 14 duplex wire.

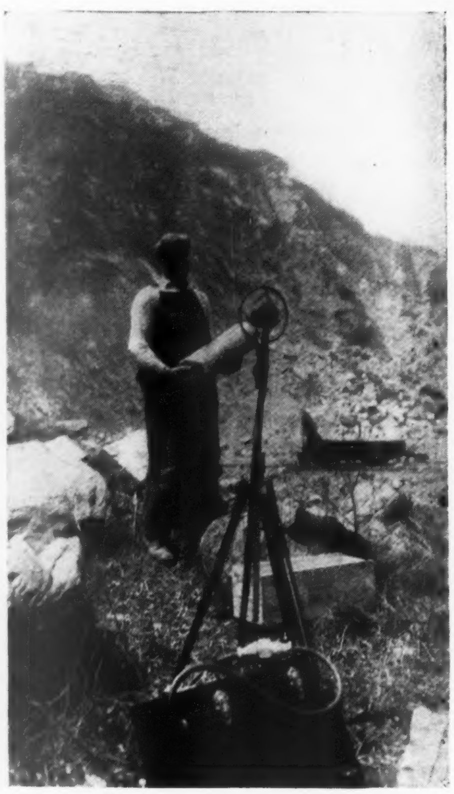
The problem of supplying stemming was taken care of in a unique manner. The power shovel used for stripping was provided with a boom and the equipment mounted on the upper rim of the quarry and the stripping lowered in buckets to the mouths of the tunnels. The powder was sent down from the quarry top in the same manner.

This shot was only the preliminary one of a blasting program, using coyote methods, that as far as driving the powder tunnels is completed. There are seven coyote tunnels with powder pockets completed spaced along the quarry floor, so after the stone from this shot has been cleaned up it will be a simple matter to load and shoot the lower half of the face by means of these seven holes. By this method no delay will be experienced in the quarry, as it will not be necessary to hold up any part of the quarry while driving the powder tunnels and pockets.

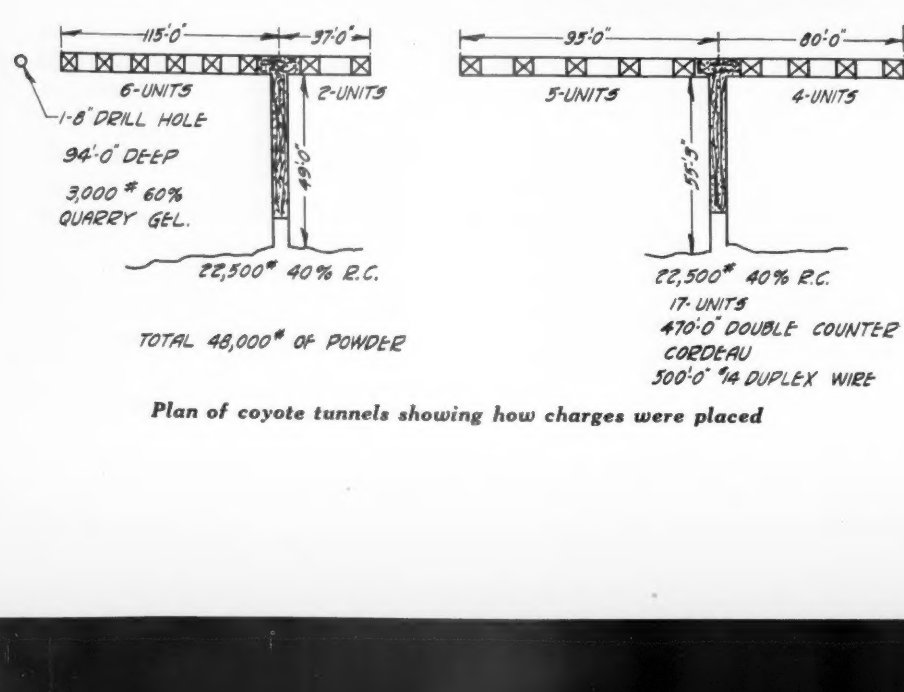
The John T. Dyer Quarry Co. at this operation is making another departure in tunnel blasting methods, first sinking a shaft back of the quarry face from which a main and series of cross drifts are being driven. A more detailed description of this innovation in blasting practice will be described in a later issue.

The tunnels were loaded under the direction of Sam R. Russell, quarry blasting expert of the E. I. du Pont de Nemours and Co. It was estimated that 250,000 tons were broken down by the shot and with fair shattering. It might be said at this point that owing to the large jaw crusher used here, a Power and Mining, 60-in. by 84-in., extreme shattering of the rock is not an essential factor at this particular operation.

A picture of the famous shot caught by a small camera



He!ping to load the "last hole"



Plan of coyote tunnels showing how charges were placed

Cement Section Holds Spirited Meeting at Southwestern Safety Congress

SESSIONS held by the Cement Section of the National Safety Council at the Southwestern Safety Congress, held at the Adolphus hotel, Dallas, Tex., April 25, were among the most active of the congress, with representative groups from all of the cement mills in the northern portion of Texas. Some 50 or 60 men were present.

The program features were as follows:

"How to Operate a Plant for One Year Without a Lost-Time Accident," R. G. Sutherland, superintendent, Trinity Portland Cement Co., Houston, Tex.

"Safety From a Blacksmith's Standpoint," Paul Groth, Lone Star Cement Co., Dallas, Tex.

"The Psychology of the Safety Campaign," V. K. Fischer, combustion engineer, Trinity Portland Cement Co., Dallas, Tex.

Round Table Discussion.

J. W. Ganser, chief chemist and assistant superintendent of the Trinity Portland Cement Co., acted as chairman.

Montana Has Successful Lady Sand and Gravel Operator

J. E. IRVINE, who operated the Green River Sand Pits, at Green River, the largest sand and gravel enterprise in Wyoming, died a year ago. His widow, Christina Irvine, assumed management as administratrix.

How well she managed it is attested by the present thriving state of the enterprise and the management which maintained and enhanced its status as that of a "going business" is impressively demonstrative of feminine capability.

In probate court a few days ago Mrs. Irvine was given title to the property as her husband's heir and hereafter will manage it as her own.—*Cheyenne* (Wyo.) *Tribune*.

Universal Atlas Cement to Build New Packing and Storage Plant at Homestead, Penn.

THE UNIVERSAL ATLAS CEMENT CO. will build six reinforced-concrete storage silos on the Union railroad between Hays and West streets, Homestead, Penn.

The bins will each be of 5000 bbl. capacity, with a total storage of 30,000 bbl. of cement. The cement will be brought to the unloading platform here and will be dumped into the huge bins and as it is used it will be sacked and distributed to the various consumers of the district.

The company has long been wanting a central distributing plant in the Monongahela and Youghiogheny valleys, and the erection of the plant here will fill a long felt want of the company. It is the intention of the company to have the bins erected during the present summer.

The cement will be brought to Homestead in special cars designed for handling the material in bulk and will be dumped into the storage tanks and used as orders are received.

Thousands of barrels of the product are used in the district during the year and it is believed that the local plant will have a tendency to increase the sales.—*Homestead* (Penn.) *Messenger.*

Inland Lime and Stone Co. Contracts Let

THE INLAND LIME AND STONE CO., Manistique, Mich., closed two important contracts recently, one embracing all the concrete for the foundations for the crushing mills, shops, etc. This contract went to Foley Bros., Inc., St. Paul, Minn. Mr. Barnhill, who is in charge of Foley Bros., stated that there would be 200 men required on their contracts when they get to running full, which will be very shortly.

After this concrete is in place, the erection of the machinery will start immediately, which will necessitate a large number of steel workers for the erection of the buildings. This contract was awarded to the Worden-Allen Co., Duluth, Minn.

The conveying machinery, as formerly announced, was let to the Stephens-Adamson Manufacturing Co., Aurora, Ill. This will comprise an additional erecting crew and will include all the machinery for the docks.

The Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has the contract for the crushers, which will be a No. 40 and a 60 gyratory. The weight of the No. 60 crusher is to be 675 tons. The crusher will stand 58 ft. above the foundation, which will necessitate a fill of approximately 30 ft. for the railroad to get to the top of it, the crusher being submerged below the ground level in a large pit.

Merritt-Chapman and Scott are progressing very well on the docks with the sheet piling and the *Keystone* dredge of the Cleveland Engineering and Dredging Co. went to work recently excavating the bottom of the harbor. They have approximately three-quarters of a million cubic yards of sand and clay to excavate in order to lower the harbor to a 22-ft. draft. This will be pumped into the docks for filling up on the land for the plant site and it will take most of the season to finish this job.—*Manistique* (Mich.) *Tribune.*

Plan Standardization of Sizes for Mineral Aggregates

THE U. S. BUREAU OF STANDARDS is co-operating with the National Slag Association, the National Crushed Stone Association and the National Sand and Gravel Association in a joint program for the simplification of sizes of mineral aggregates used in highway construction and the standardization of screen sizes to meet these requirements. Tentative sizes have been adopted by the several groups individually for consideration at a general conference that probably will be called in June by the division of simplified practice. The standards committee of the National Sand and Gravel Association has recommended two grades of sand and five grades of gravel. The problems committee of the National Slag Association has proposed five primary sizes that represent 65% of the present tonnage. The bureau has not yet received the recommendations of the National Crushed Stone Association, but it is expected that nine sizes probably will be proposed. It is the bureau's purpose to include all the sizes finally determined upon into a single list for publication.

Warner Company Buys Wilmington, Del., Retail Yard

THE WARNER CO., Philadelphia, Penn., has acquired the building supply division of the Edward R. Tusey Co., Wilmington, Del. The terms of the purchase and price paid are not disclosed. Payment was made in common stock of the Warner Co. Joseph M. Tusey, president of the Tusey Co., relinquishes his active connection with the management of the company and has been elected a vice-president of the Warner Co.

Fire in Bellevue, Mich., Plant

FIRE, which broke out at 11 o'clock, April 14, in the power room of the Alpha Portland Cement Co., Bellevue, Mich., caused serious damage to the power lines.

The fire started when workmen painting electrical coils broke a light bulb. The Bellevue fire department was called and extinguished flames with chemicals. George Lawnizcak, superintendent, declared that repairs would be completed immediately.

Ohio County Auditor Sent to Jail for Taking Commissions on Stone

HARRY Q. GASKILL, former auditor of Clinton county, was taken to the Ohio state penitentiary at Columbus, April 18, to begin serving a sentence of two to ten years.

Gaskill pleaded guilty before Judge W. H. Jewell to two indictments charging him with receiving commissions from the Casparis-Ohio Stone Quarries Co., Columbus, for stone delivered to county highways. Sixty indictments, many of which charge forgery and uttering and publishing a forged warrant, are still pending against Gaskill.

Gaskill was the first of six men indicted by the October grand jury in its record breaking session for alleged discrepancies found in county offices.—*Wilmington* (Ohio) *News-Journal.*

Minnesota Stone Plant Sold at Auction

THE STONE QUARRY and equipment of the Calcium Products Co., located about two miles east of Hastings, Minn., was sold at a second sheriff's sale at the courthouse doors April 2.

The M. C. Cree Contracting Co., St. Paul, was the successful bidder for the property with an offer of $1,650. The sale was attended by a number of contractors and interested parties, many of whom participated in the bidding.

The offer of the St. Paul firm was more than double that of the contractor who submitted the high bid at the first quarry sale several weeks ago but whose offer was rejected when the court refused to affirm the sale.

The Cree Contracting Co., new owners of the property, will dismantle the machinery at the plant and move it to some other location, it is understood. Besides the plant and equipment, about twenty-one acres of land is involved in the sale.—*Hastings* (Minn.) *Gazette.*

Golsan With Engineering Firm

PAGE GOLSAN, former vice-president of the Great Western Portland Cement Co., Kansas City, Mo., has been appointed manager of the new business department of the engineering organization of Ford, Bacon and Davis, New York City.

The announcement made by Ford, Bacon and Davis says: "Mr. Golsan was associated with this firm for many years before taking up his duties with the Great Western Portland Cement Co. and now returns to take charge of new business activities, covering the field of natural gas pipe line construction, industrial appraisals and management and many other lines of work. Mr. Golsan, who is a nephew of William Volker of Kansas City, was associated earlier in his career with the Fleishhacker interests of San Francisco and southern California.

Foreign Abstracts and Patent Review

Influence of Trass on Set of Cement. A Steopoe determines the influence of trass obtained from the Roumanian deposits at Slanic and Dej, upon the setting period of Kuhl cement, ordinary portland and high strength portland cement. A chemical analysis of each material is given. As much as 30% trass was added to the portland cement and up to 50% to the Kuhl cement. In general, the addition of trass retards the setting process of the portland cements. However, the trass has less effect upon high strength cement than upon ordinary portland cement. The start of hardening of the Kuhl cement is consistently accelerated by the addition of trass, whereas the end is retarded by smaller additions of trass, but with larger additions of trass it is first accelerated, then again retarded considerably. The Slanic trass is more vigorous and marked in its effect than the Dej trass. Table 1 gives the composition of the trasses and the cements. Table 2 gives the residue of trass on the screens. Tables 3 and 4 give the test results.—*Tonindustrie-Zeitung* (1930) **54,** 15, pp. 237-239.

TABLE 1—ANALYSES OF TRASS AND PORTLAND CEMENT

	Slanic Trass	Dej Trass	Gew. Portland Cement	Hochw. Portland Cement	Kuhl Cement
Ig. loss	14.42	13.85	1.49	1.55	2.49
SiO_2	65.44	62.52	20.60	20.64	18.68
Al_2O_3	10.85	11.62	6.30	5.98	7.09
Fe_2O_3	1.63	1.84	2.56	2.78	5.52
CaO	4.64	6.56	67.13	66.89	62.98
MgO	0.46	0.72	1.11	0.58	1.17
SO_3	....	....	0.90	1.50	2.02
Balance	2.56	2.89	0.08	0.08	0.05

TABLE 2—RESIDUE IN PER CENT ON SCREENS OF VARIOUS MESH

	4900	2500	1600	900
Slanic trass	30	22	8	0
Dej trass	37	27	11	1

TABLE 3—EFFECT OF TRASS ON SETTING TIME OF PORTLAND CEMENT

Trass addition in per cent, %	0	5	10	15	20	25	30
Mixing water per 100 gal., cc.	27.5	28	28.5	29	30	31	32.5
TRASS OF SLANIC							
Start of set, hr.	3¼	4½	4¾	5	5½	6½	7½
End of set, hr.	7	7¾	7¾	8	8	9½	10½
Difference, hr.	3¾	3¼	3	3	2¾	3	2¾
TRASS OF DEJ							
Start of set, hr.	3¼	4	4¼	4½	4¾	5¼	5½
End of set, hr.	7	7½	7½	8	8¼	8¼	8¾
Difference, hr.	3¾	3½	3¼	3½	3½	3½	3¼

TABLE 4—EFFECT OF TRASS ON SETTING TIME OF HIGH STRENGTH PORTLAND CEMENT

Trass addition in per cent, %	0	10	20	30
Mixing water per 100 gal., cc.	25	26.5	28	30
TRASS OF SLANIC				
Start of set, hr.	2¾	3	3¼	3½
End of set, hr.	4¾	5	5	5½
Difference, hr.	2	2	1¾	2
TRASS OF DEJ				
Start of set, hr.	2¾	2¾	3	3½
End of set, hr.	4¾	5¼	5½	5¾
Difference, hr.	2	2½	2½	2¼

Phenomena Occurring in Sacked Cement. Dr. Luftschitz contributed an article on this subject to *Tonindustrie-Zeitung,* No. 84, 1929; V. M. A. to *Zement,* No. 46, 1929; Goslich sen. to *Tonindustrie-Zeitung,* No. 98, 1929; K. A. Goslich Jun. to *Tonindustrie-Zeitung,* No. 87, 1929. In the present discussion the various authors restate their points, and the subject is considered as being concluded by the editors.

* * *

H. Nitzsche, replying to Luftschitz, shows that paper sacks containing lime admit besides moisture atmospheric carbonic acid. Inside of 56 days the carbonic acid content increased from 5.14% to 12.48% for lime *A* and from 3.64% to 7.81% for lime *B,* when using three-ply paper sacks; and from 5.14% to 16.51% for lime *A* and from 3.64% to 8.65% for lime *B,* when using jute sacks. Inside of 56 days the water content increased from 0.03% to 0.46% for lime *A* and 0% to 0.65% for lime *B,* when using paper sacks; and from 0.03% to 0.75% for lime *A* and from 0% to 0.75% for lime *B,* when using jute sacks.

* * *

H. Luftschitz, in replying at this time to K. A. Goslich, conceives that fresh cement, due to the presence of free lime, endeavors to absorb carbonic acid through the paper sack, and that carbonic acid is retained in the paper sack. A cement with start of set at 2 hr. 21 min. was changed to a cement with start of set at 4 min. by introducing gaseous carbonic acid. Hence, a cement may test rapid set, or early strength, if a sample for testing happens to be obtained from a portion of the sacked cement which contains carbonic acid. However, the rapid set cement soon becomes of normal set. Test data is given as proof. Luftschitz concludes that the ability to absorb gaseous carbonic acid is greatest when the cement is in a fresh, damp condition; that it is not improbable that gaseous carbonic acid adheres superficially on somewhat damp cement; that the moisture plays no part for up to three days after opening the sack, and that it does not start to increase in quantity until after three days; and lastly, that the absorption of carbonic acid plays a part at the beginning and looses this part as the moisture increases. The part that the carbonic acid plays is still unsolved.

Luftschitz continues, that Goslich related (*Tonindustrie-Zeitung,* No. 98) how he changed a rapid set cement into a slow set cement by placing a 50-ft. tube at the discharge of the mill, in which the cement was exposed to outside air flowing in an opposite direction. Luftschitz suggests here that this is probably a case in which the carbonic acid not yet fully absorbed by the lime in the cement is expelled by means of aeration. He suggests installation of ventilating apparatus between the cement bin and the sacking plant. Perhaps then the cement can be packed and shipped while fresh, for it is not known what process "seasons" the cement in the bin during its storage, nor is it known why an opened paper sack can yield at once a rapid set cement, whereas, when only one corner is torn from the sack, the cement can, after 4 to 5 hours, show a start of setting at 6 hours. Perhaps the driving out of "latent" carbonic acid from raw cement is more important than "waiting" for carbonic acid. A solution of this problem would perhaps also show why a carbonate, such as soda, is able to accelerate setting considerably.

Luftschitz then states that the query of Goslich, sen., as to why so little gypsum is able to affect so much cement, may be answered by saying that cement when worked, first gives off lime; and the carbonic acid already attached to the lime but not yet entirely used, may have a part in the elimination of lime. Only a complete wetting unites lime with gaseous carbonic acid.

* * *

Then K. A. Goslich comments on the statements of Nitzsche and Luftschitz. Carbonic acid is taken up by lime undoubtedly much more vigorously than by cement, and the fixing of carbonic acid becomes easier when a certain humidity is present. This moisture makes the lime more absorptive and it passes also to the paper which becomes thus a transmitter of atmospheric carbonic acid to the lime. He cannot accept the assumption of Luftschitz that gaseous carbonic acid should remain in the cement sack when the cement is damp.

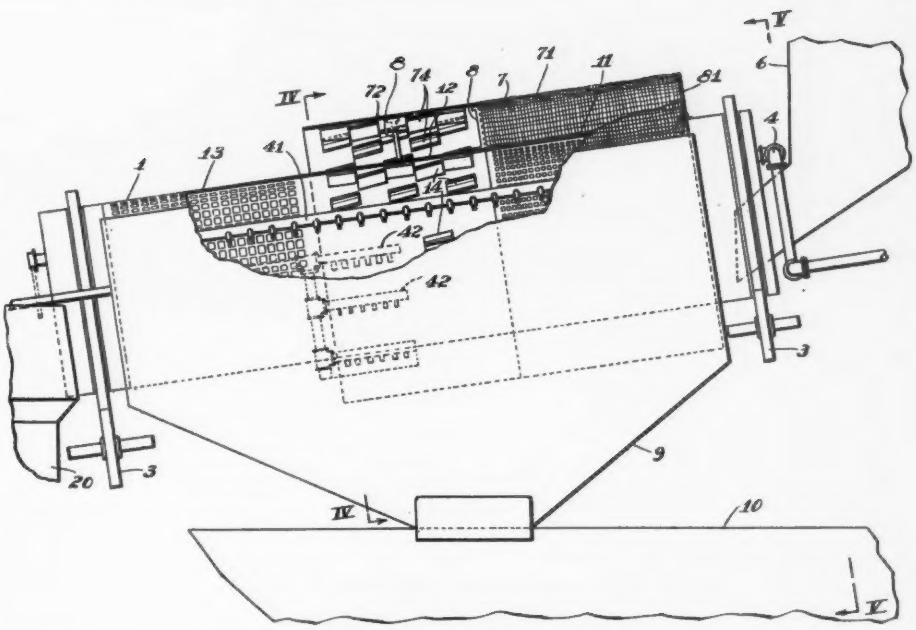
The gaseous carbonic acid could not change the set of the cement until after it is absorbed by the cement, but when it has been absorbed, therefore has formed carbonate of lime, it can no longer be expelled by aerating the cement, but only by a vigorous heating. Shoveling or aerating the cement not only makes a rapid set cement a slow set one, but eliminates also any tendency to unsoundness.—*Tonindustrie-Zeitung* (1930) **53,** 102-103, pp. 1791-1793.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Washing Gravel. The ordinary method of washing gravel, where scrubbing is required, is to place a scrubber ahead of a revolving screen, either separately or attached to the main section of the screen. In the device shown the main section of the screen is separated into two parts by a scrubbing section and another scrubbing section is attached to the screen jacket. In this way the scrubbing area is greatly increased without making the screen any longer than it would be with the scrubbing section in front. It also divides the material so that the sprays used in washing are more efficient.

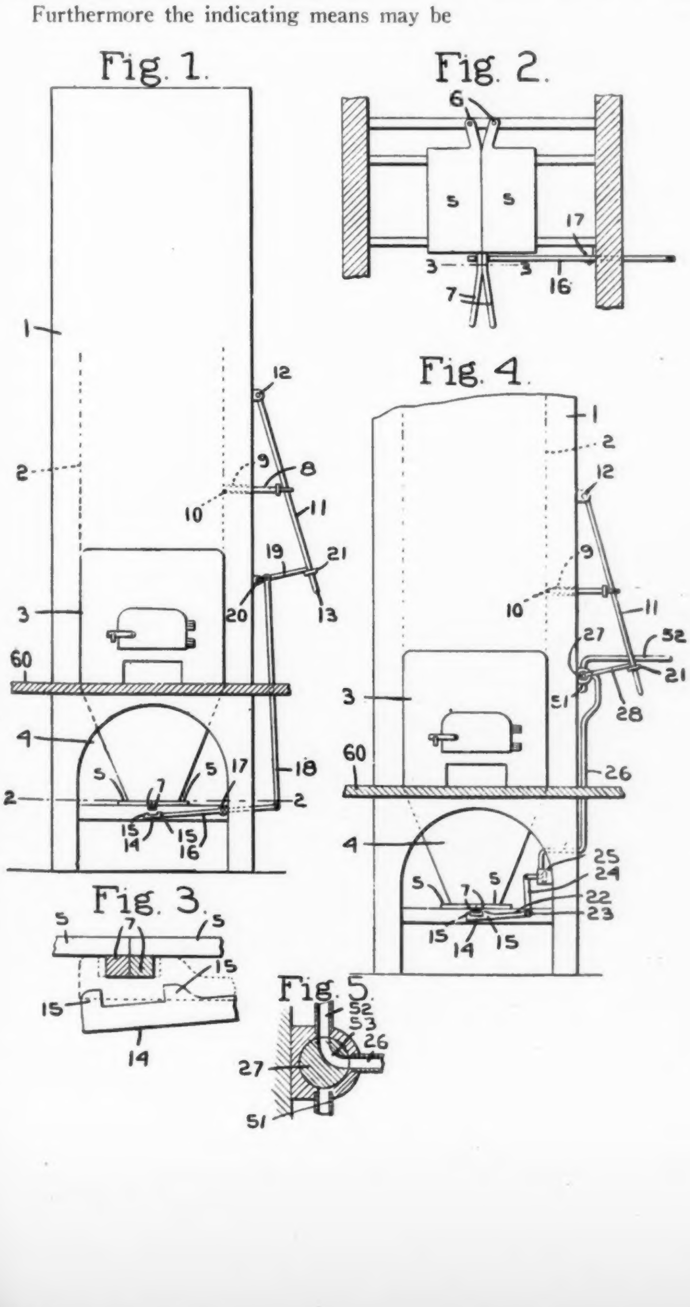
The patent suggests that the perforations in the first part of the main section should be of the order of 1½ in., and in the farther section of the order of 3 in., while the jacket should have holes of the order of ⅜ in., thus making a sand product and two gravel products each separately washed.—*F. R. Dravo, U. S. No.* 1,735,738.

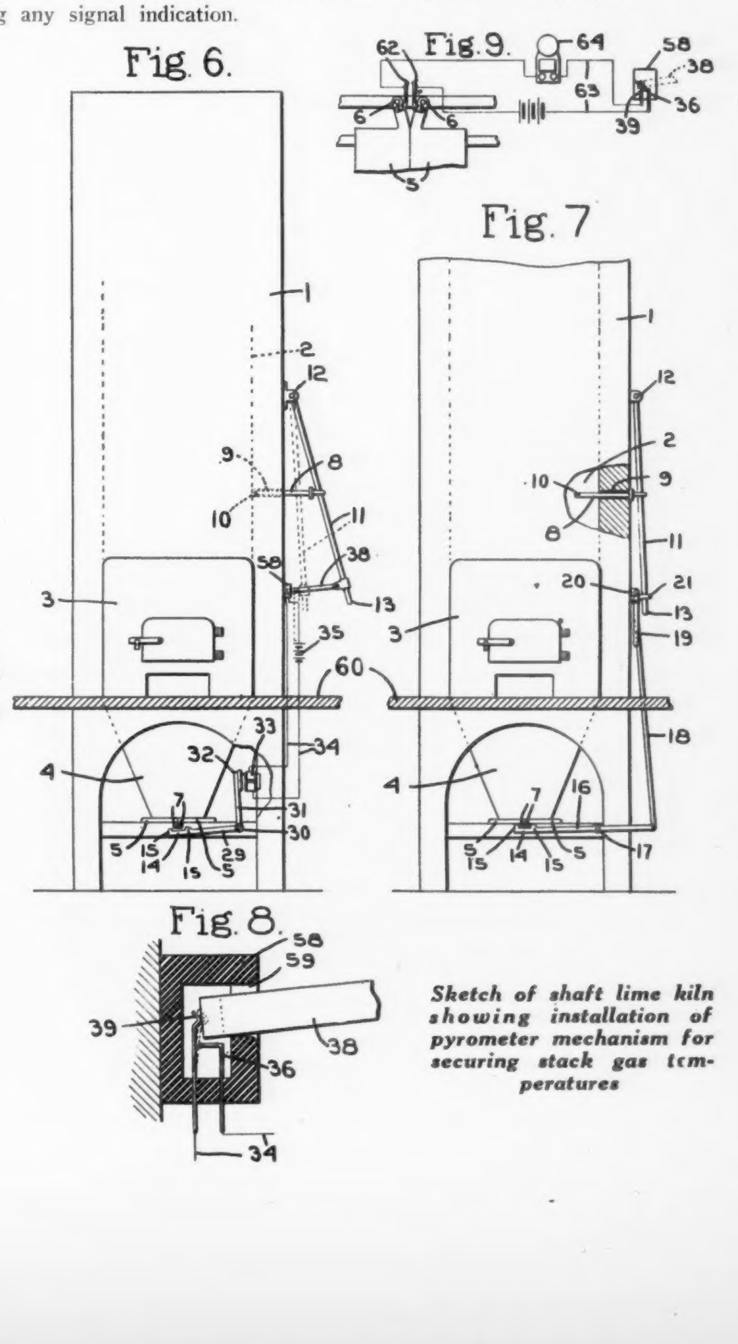


Device for washing gravel

Lime Kiln with Pyrometer Mechanism. The invention provides for the insertion of a pyrometer mechanism in a lime kiln to get stack gas temperatures and a novel means of indicating that the pyrometer is in operative position when attempts are made to draw the kiln at times when the pyrometer is thus positioned. The indications may be either in the nature of a signal, either audible or visual, which will be given whenever an attempt is made to open the shears while the pyrometer is in its operative position or may be in the nature of a lock device which will lock the shears from opening when the pyrometer is in such position. Where the lock form of indication is employed the invention so constructs the lock that so long as the pyrometer is in its operative position within the kiln the shears will be locked and will be released only when the pyrometer is withdrawn from the kiln chamber.

Furthermore the indicating means may be used for locking the pyrometer in its withdrawn position, the indicating device at this time being held inoperative so that the material may be freely withdrawn from the stack without giving any signal indication. When, however, the pyrometer is introduced into the stack for the purpose of obtaining a reading the signal becomes operative.—*A. E. Truesdell, U. S. No.* 1,706,423.





Sketch of shaft lime kiln showing installation of pyrometer mechanism for securing stack gas temperatures

Two Sand and Gravel Dredge Employes Drown

TWO MEN, members of the crew of the dredge boat *Broward,* a sand pumper, drowned near Hardin, Ill., April 30, one when a motor boat in which he was riding was swamped by the rough water of the Illinois river, and the second when he fell into the stream in an attempt to effect a rescue.

Patrick O'Neill, 29, the engineer, and Arthur Schleeper, also one of the crew, were going toward shore in the motor boat when it sank after being inundated by a large wave. O'Neill perished, but Schleeper was rescued.

Phillip Castor, 27, second mate on the dredge, was standing on the east bank of the river and witnessed the tragedy. He vainly endeavored to signal hands aboard the dredge, and failing, removed his shoes and began to crawl to the craft on the pontoon line, a pipe which carries the material pumped from the stream to the bank. In his haste he lost his footing and vanished in the water.

His body was recovered after a two-hour search, while O'Neill's body was not recovered.—*St. Louis* (Mo.) *Globe Democrat.*

Owner of Small Gravel Pit Killed by Cave-In

IVOR DAVIDSON, 35, manager and owner of the Troutdale Sand and Gravel Co., was buried, April 20, under 8 ft. of gravel at his pit on the Hensley road about one mile north of the Base Line road, near Portland, Ore., and crushed to death.

He went to the pit alone about 3:30 p. m. and the slide was discovered two hours later by W. D. Henckley, who was working nearby. He called workmen and the body was excavated.

Mr. Davidson was survived by a widow, two brothers, Glen and Ralph Davidson of Gresham, and his parents, Mr. and Mrs. E. Davidson of Gresham. He had lived in Gresham many years and was widely known throughout the community.—*Portland* (Ore.) *Journal.*

Employe of Portable Gravel Plant Killed by Accident

FRED BECKER, 25 years old, an employe of the Tyler and Baker Construction Co., was killed April 14 at the company's gravel pit a few miles west of Craig.

A belt attached to a tractor and the rock crusher moved at the rate of 2300 ft. per min. While Becker was adjusting the jaws of the crusher, and in pulling an iron bar to make the adjustment, the bar snapped. He fell on his back on the belt and before the power could be shut off he was carried head first into the tractor and killed instantly.

Dr. T. G. Clayton of Craig was called and went to the scene of the accident immediately. He found Becker's neck had been broken.

Dr. Driscoll, the coroner of Moffat county, held an inquest Tuesday, April 15, at Craig and the jury found death the result of an unavoidable accident.

Becker was unmarried and a newcomer to this country. Relatives in New Salem, Md., were notified and the body will be sent there for burial.—*Hayden* (Colo.) *Republican.*

Nevada to Have a Cement Mill?

CONSTRUCTION of a 1600-bbl. cement plant near Glendale, Nev., on the way to Muddy river, will get under way within the next 10 days is announced by E. C. Keelen, Los Angeles and Las Vegas investor, who revealed plans for this plant several weeks ago. Everything is all set to go, according to Mr. Keelen, who says he has already contracted for the entire output of the mill.

Mr. Keelen has some 30 men at work on his brick and tile plant on the west side and expects to add considerably to this number when the cement mill is actually started.

The mill will be a dry process plant, with some 125 men on the payroll when it starts operation, Mr. Keelen says. — *Tonopah* (Nev.) *Times-Bonanza.*

New Georgia Limestone Plant Nearly Ready

THE ATLANTIC LIMEROCK CO., Sandersville, Ga., is getting everything in readiness for mining limerock on its lands two miles southwest of Sandersville. The crusher house has been completed. The runway for the dump cars has been finished and other work on the premises is going along at a rapid rate. A filtering system will be installed to remove all lime deposits from the water that will be used for steam locomotives and steam shovels. The machine shop also has been completed.

The contractors are busy with a large force of men and mules in grading the right-of-way from the Georgia and Florida R. R. main line down to the crushing plant. This track will be about one mile in length, running west. A connection will also be made at this point with the Sandersville Railroad. Both companies will serve the crushing plant, the tracks being built and maintained jointly. It is estimated that three weeks time will be required to complete the grading. This will be followed by the track laying forces of the two railroads. As soon as the siding is completed the plant's machinery will be unloaded and operations will begin about June 1.

The capacity of the plant will be from 50 to 100 cars a day by operating night and day shifts. A large transformer station has been erected by the Georgia Power Co. furnishing current from a 44,000-volt transmission line. Motors will be used to operate the crusher, dump cars to the crusher and loading the finished product in cars.

J. E. Brookner, of Augusta, who has had considerable experience in mining operations is in direct charge of the plant.—*Sandersville* (Ga.) *Progress.*

Cement Institute Establishes Chattanooga Office

THE CEMENT INSTITUTE, with headquarters in New York City, has established a district office at Chattanooga, Tenn., in charge of J. H. Dalbey. The objects and code of ethics of the Cement Institute were published in ROCK PRODUCTS, February 15, 1930.

Gain in Concrete Paving Contracts in First Quarter

CONTRACT AWARDS for concrete pavement construction for the first three months of 1930 reached a new high total, according to a report made to Julius H. Barnes, chairman of the National Business Survey Conference committee by Wm. M. Kinney, general manager of the Portland Cement Association, Chicago, Ill.

The awards of concrete roads, streets and alleys for the first quarter of the year were 27,209,194 sq yd., an increase of 62% over awards for the same period in 1929. That state and county officials are responding whole-heartedly to President Hoover's suggestion to speed up public work is apparent in this comparison.

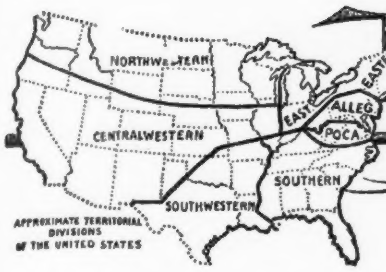
The difficulty experienced in many cities during 1929 in disposing of special assessment bonds and warrants, on which street paving contracts so largely depend and which to some extent affected street awards earlier in the year, seems to be diminishing. The outlook is good for awards of street improvements and continuation of the necessary street widening, grade separation and street betterment programs so badly needed in large cities seems likely to proceed with renewed vigor.

General Electric Reduces Prices

THE GENERAL ELECTRIC CO. has announced, effective immediately, price reductions of from 3% to 5% covering various standard lines of electric apparatus. These reductions were made as a reflection of the recent recession in the price of copper.

Mississippi Legislators Vote Down State Cement Plant

THE PROPOSAL of Governor Bilbo, of Mississippi, for a $2,000,000 state cement plant, as part of the state highway program was defeated in the state legislature on April 25.



Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Apr. 5	Apr. 12	Apr. 5	Apr. 12
Eastern	2,869	3,004	4,349	5,729
Allegheny	2,552	2,637	4,663	5,473
Pocahontas	449	452	992	1,271
Southern	675	837	7,549	8,143
Northwestern	1,027	1,116	2,998	3,813
Central Western	537	558	9,208	10,624
Southwestern	487	568	6,138	7,553
Total	8,596	9,172	35,897	42,606

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

	Limestone Flux		Sand, Stone and Gravel	
	1929	1930	1929	1930
	Period to date		Period to date	
District	Apr. 13	Apr. 12	Apr. 13	Apr. 12
Eastern	36,150	32,795	39,590	38,484
Allegheny	43,006	33,962	41,697	44,036
Pocahontas	3,335	3,485	5,948	9,847
Southern	6,573	9,254	105,238	93,492
Northwestern	10,058	9,012	25,377	20,768
Central Western	7,455	7,054	86,152	90,754
Southwestern	6,020	5,201	73,539	68,501
Total	112,597	100,763	377,541	365,882

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	***1930***
Limestone flux	***112,597***	***100,763***
Sand, stone, gravel	***377,541***	***365,882***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning May 3:

TRUNK LINE ASSOCIATION DOCKET

23433. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, **and/or gravel,** carloads (See Note 2), from Patapsco, Md., to Collington, Md., 75c per net ton. (Present rate, 95c per net ton.) Reason—To meet motor truck competition; also proposed rate is comparable with rates from Arundel, Md., to Halethorpe, Lafayette and Gwynns Run, Md.

23438. **Crude fluxing limestone,** carloads (See Note 2), from Pleasant Gap, Penn., to Huntingdon, Penn., $1.13 per gross ton. (Applies only when shipped in open-top equipment. During period of car shortage when open-top equipment is not available and closed equipment is furnished at carrier's option, the rate provided for open-top equipment will apply.) (Present rate, 15½ per 100 lb., sixth class.) Reason—Proposed rate is comparable with rates from Bellefonte and Pleasant Gap, Penn., to Johnstown, Punxsutawney and Indiana, Penn.

23440. **Limestone, unburnt, ground or pulverized,** carloads, minimum weight 50,000 lb., from Martinsburg, W. Va., and Group 1 points per B. & O. I. C. C. 21047, to Reel's Mills, Jamesville, Monrovia and Bartholow, Md., 5c per 100 lb. (Present rate, 6c per 100 lb.) Reason—Proposed rate is comparable with rates from Stephens City, Va., etc., to same points.

M-1406. **Crushed stone,** carloads (See Note 2), from LeRoy, N. Y., to Gold, Penn., $1.45 per net ton. (Present rate, $1.50 per net ton.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

23471. **Stone, viz.: fire, ganister,** carloads (See Note 2), from Barree, Brookes Mills, Flowing Spring, Hannah, Harbison-Walker Refractories Co. No. 16, Madley Moores Mills, Mt. Union, Reedsville, Wolfsburg, Penn., and Cumberland, Md. (Proposed rates in cents per net ton; present rates in cents per 100 lb.)

To	Prop.	Pres.
Alexandria, Ind.	365	21½
Ashland, Ky.	325	19
Chicago, Ill.	415	24
Cincinnati, O.	330	19
Columbus, O.	315	18½
Detroit, Mich.	330	18½
East St. Louis, Ill.	520	28
Findlay, O.	300	19
Gary, Ind.	415	24
Hamilton, O.	330	19
Indianapolis, Ind.	365	21½
Ironton, O.	325	19
Joliet, Ill.	415	24
Louisville, Ky.	415	24
Mansfield, O.	280	18½
Middleport, O.	320	19
Middletown, O.	330	19
Muncie, Ind.	365	21½
Muskegon, Mich.	415	24
Mt. Vernon, O.	280	18½
Pomeroy, O.	320	19
Portsmouth, O.	325	19
South Chicago, Ill.	415	24
South Columbus, O.	315	18½
Springfield, O.	330	19
Toledo, O.	300	18½
Zanesville, O.	280	18½

Reason—Proposed rates are comparable with rates on fire brick from Mt. Union, Penn., and Cumberland, Md., to same points of destination.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

23454. **Crushed stone,** carloads (See Note 2), from Bound Brook, N. J., to Bayway, N. J., $1.10 per net ton. (Present rate, $1.38 per net ton.) Reason—Proposed rate is comparable with rates from Morrisville and Tullytown, Penn., to Metuchen, N. J.

M-1408. **Crushed stone, broken stone and stone screenings,** carloads (See Note 2), from Cavetown, Md., to Gettysburg, Penn., 70c per net ton. Rate to expire October 31, 1930. Present rate, 80c per net ton. Reason—To meet motor truck competition.

23462. **Sand,** in open-top and closed equipment, carloads (See Note 2), from Pinewald, Toms River and Quail Run, N. J., to Washington, D. C., $2.45 in open-top equipment and $2.65 per net ton in closed equipment. Reason—Proposed rates compare favorably with rates from South Jersey points to Washington, D. C.

23490. **Stone, natural, crushed,** carloads, in steel shipping containers loaded in container cars, minimum weight 125,000 lb., from New Hamburg, N. Y. to stations on the Harlem and Putnam Divisions of the N. Y. C. R. R. Rates ranging from 85c to $1.40 per net ton. Reason—Proposed rates are comparable with rates maintained on same traffic handled in ordinary equipment.

23513. **Stone, natural, crushed,** carloads (See Note 2), from Mill Hall and Avis, Penn., to Pennsylvania division points of the N. Y. C. R. R. Rates ranging from 60c to $1.30 per net ton. Reason—Proposed rates are comparable with rates ordered by the P. S. C. Penn. in Docket 8120.

23286. To amend Rate Proposal No. 23286, **engine sand,** from Berkeley Springs and Hancock, W. Va., to Cherry Run, W. Va., by changing description to read as follows: Sand, engine, blast, glass, molding and ground flint, carloads, minimum weights and rates remain the same.

23342. **Glass sand,** carloads (See Note 2), to Coraopolis and Monaca, Penn., from Berkeley Springs, Great Cacapon and Hancock, W. Va., $1.95, and from Triplett, Va., $2.10 per net ton.

CENTRAL FREIGHT ASSOCIATION DOCKET

24575. To establish on **sand** (all kinds) **and gravel,** carloads, from Wapakoneta, O., to Coldwater, O., rate of 70c per net ton. Present rate, sixth class rate of 10½c.

24576. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads, from Hugo, O., to points in Ohio, rates as shown below. Present and proposed rates:

To	Prop.	Pres.
Conneaut, O.	105	110
Vermillion, O.	90	100
Wakeman, O.	95	100
Huron, O.	100	110
Norwalk, O.	100	110
Monroeville, O.	100	110
Bellevue, O.	105	140

24578. To establish on **sand, viz.: blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica,** carloads, from Sandusky, O., group, Toledo, O., group and Canton, O., group, to points in Kentucky, Ohio, and West Virginia, rates as shown in exhibit "A" attached. Present rates, as shown in exhibit "A" attached.

EXHIBIT "A"

Statement of Present and Proposed Rates on Sand

From Sandusky, O., Group

To	Pres.	Prop.
Ashland, Ky.	227	227
Athens, O.	150	150
Catlettsburg, Ky.	227	227
Chillicothe, O.	(2)160	160
Coalton, O.	(2)180	165
Cornelia, O.	180	165
Dundas, O.	(2)160	160
Gallipolis, O.	160	160
Glen Jean, O.	(2)165	165
Guyandotte, W. Va.	239	227
Hamden, O.	(2)160	160
Huntington, W. Va.	239	227
Ironton, O.	165	165
Jackson, O. (2)	(7)165	165
Kavanga, O.	160	160
Kenova, W. Va.	227	227
Marietta, O.	150	150
Middleport, O.	(4)160	160
Musselman, O.	(2)160	160
Parkersburg, W. Va.	210	210
Point Pleasant, W. Va.	239	227
Pomeroy, O.	(4)160	160
Portsmouth, O.	165	165
Riverton, Ky.	......	227
Sciotoville, O.	165	165
Waverly, O.	(2)165	165
Wellston, O.	(4)150	160

From Toledo, O., Group

To	Pres.	Prop.
Ashland, Ky.	227	227
Athens, O.	150	150
Catlettsburg, Ky.	210	227
Chillicothe, O.	150	150
Coalton, O.	150	150
Cornelia, O.	......	150
Dundas, O.	150	150
Gallipolis, O.	160	160
Glen Jean, O.	......	165
Guyandotte, W. Va.	......	227
Hamden, O.	150	150
Huntington, W. Va.	239	227
Ironton, O.	(1)180	165
Jackson, O.	150	150
Kavanga, O.	160	160
Kenova, W. Va.	210	227
Marietta, O.	180	(8)160
Middleport, O.	(4)160	160
Musselman, O.	150	150
Parkersburg, W. Va.	210	210
Point Pleasant, W. Va.	(5)210	227
Pomeroy, O.	160	160
Portsmouth, O.	(6)180	165
Riverton, Ky.	227	227
Sciotoville, O.	180	165
Waverly, O.	180	165
Wellston, O.	150	150

From Canton, O., Group

To	Pres.	Prop.
Ashland, Ky.	227	227
Athens, O.	160	160
Catlettsburg, Ky.	227	227
Chillicothe, O.	160	160
Coalton, O.	160	160
Cornelia, O.	160	160
Dundas, O.	160	160
Gallipolis, O.	160	160

Glen Jean, O.	160	160
Guyandotte, W. Va.	(3)227	227
Hamden, O.	160	160
Huntington, W. Va.	(3)227	227
Ironton, O.	160	160
Jackson, O.	160	160
Kavanga, O.	160	160
Kenova, W. Va.	(3)227	227
Marietta, O.	140	140
Middleport, O.	160	160
Musselman, O.	160	160
Parkersburg, W. Va.	202	202
Point Pleasant, W. Va.	(3)227	227
Pomeroy, O.	160	160
Portsmouth, O.	160	160
Riverton, Ky.	......	227
Siotoville, O.	160	160
Waverly, O.	160	160
Wellston, O.	160	160

(1) N. Y. C. rate, 165.
(2) B. & O. rate, 150.
(3) W. & L. E. rate, 202.
(4) W. & L. E. rate, 180.
(5) H. V. rate, 227.
(6) W. & L. E. rate, 160; N. Y. C. rate, 165.
(7) C. C. C. & St. L. rate, 150.
(8) Account intermediate to Belpre, O., via B. & O. R. R.

24610. To establish on **rip rap or waste stone**, carloads, from Bedford-Bloomington, Ind., stone district to Muskegon, Mich., rate of $2 per net ton. Route—Via C. & L. Ry., Michigan City, Ind., P. M. Ry. Present rate—$2.80 per net ton.

24619. To establish on **sand** (all kinds) **and gravel**, carloads, from Kent Sand and Gravel Pit, O., to Alexanders and Brecksville, O., rate of 80c per ton of 2000 lb. Route—Via W. & L. E. Ry., Kent, O., B. & O. R. R. Present rates—Sixth class.

24620. To establish on **crushed stone**, carloads, actual weight will apply from Greencastle and Limestone, Ind., to stations on the Erie R. R., rates as shown below:

Road	Station	Kickapoo Scale	Mileage	Junction
Erie	Hammond	125	159.9	*
Erie	Kouts	115	125.1	*
Erie	North Judson	115	124.4	*
Erie	Rochester	125	155.3	*

*Via Wilders, Ind.
Present rates are on classification basis.

24641. To establish on **crushed stone, crushed stone screenings, etc.**, carloads (See Note 3), from Bluffton, Ind.

To—	Present	Proposed
Gar Creek, Ind.	6th class	80
Woodburn, Ind.	6th class	85

Route—Via N. Y. C. & St. L. R. R.-Fort Wayne, Ind.-Wabash Ry.

24648. To establish on **crushed stone**, carloads (See Note 3), Marion, O., to Shiloh and Greenwich, O., rate of 70c net ton. Present—80c net ton.

24651. To establish on **crushed stone, crushed stone screenings, agricultural limestone or agricultural limestone screenings**, carloads (See Note 3), Marion, O., to Chagrin Falls, O., rate of 90c per ton of 2000 lb. Present rate, sixth class, 17c.

24652. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Wolcottville, Ind., to Findlay, O., rate of $1.10 per net ton. Route—Via Wabash Ry., Toledo, O., and N. Y. C. R. R. Present, 16c (sixth class).

24654. To cancel rates on (a) **sand**, as described in Item Nos. 11210 and 11215 of C. F. A. L. Tariff No. 218G, I. C. C. 2253, from Hartford, O., to Clarion, Gordontown, Henderson, Holden, Strattonville, Waterson, Carrier, Coleman's Spur, Harlan and Summerville, Penn. (b) **Sand, viz., blast core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica** (See Note 3), from Hartford, O., to points in Indiana, Michigan, New York, Ohio, Pennsylvania and West Virginia, named on pages 111 and 112 of N. Y. C. R. R. Tariff I. C. C. L. S. 1413. Proposed rates—Class rates on combination of intermediate rates to apply in lieu thereof.

24659. To establish on **agricultural limestone, unburned, crushed stone and stone screenings**, in bulk or open top cars (See Note 3), Marion, O., to Newcomerstown, O., rate of $1.05 per net ton. Present rate, $1.40 per net ton.

24661. To establish on **crushed stone**, in bulk in open top cars (See Note 3), Thrifton, O., to Cambridge, O., rate of $1.25 per net ton. Present rate, $1.50 per net ton.

24663. To establish on **crushed stone**, in bulk in open top cars (See Note 3), Piqua, O., to Moraine, O., rate of 75c per 2000 lb. Present rate, sixth class.

24666. To establish on **crushed stone** (See Note 3), Lewisburg, O., to Union City, Ind., rate of 80c per net ton. Route—Via Cincinnati Northern R. R., Meekers, O., and P. R. R. Present rate, 90c per net ton.

24674. To establish on **sand** (except core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) **and gravel** (See Note 3), from Fairview, Penn., to points in Ohio, Pennsylvania and New York, rates as illustrated in Exhibit A attached. Present rates, as illustrated in Exhibit A attached.

EXHIBIT A

To (Via N. Y. C.)	Prop.	Pres.
Geneva, O.	(3) 65	(7) 80
Erie, Penn.	50	(9) 90
Angola, N. Y.	90	(11)139
Titusville, Penn.	110	(9)140
Oil City, Penn.	100	(7)100
Youngstown, O.	100	(7)100
(Via B. & L. E.)		
Linesville, Penn.	80	(21)105
Mercer, Penn.	90	(21)140
Hilliards, Penn.	100	(21)160
(Via P. R. R.)		
Corry, Penn.	80	(17)260
Du Bois, Penn.	150	(17)400
Niles, O.	100	(17)300
Economy, Penn.	120	(17)360
Brookville, Penn.	150	(17)400
(Via P. & L. E.)		
New Castle, Penn.	100	(7)100
Beaver Falls, Penn.	120	(7)160
(Via N. Y. C. & St. L.)		
Cleveland, Ohio	(1) 75	(17)300

(1) Rate on gravel, 100c.
(3) Rate on gravel, 70c.
(7) Intermediate from Erie, Penn.
(9) Intermediate from Ashtabula, O.
(11) Intermediate from Ashtabula, O., to Buffalo, N. Y.
(17) Sixth class.
(21) Intermediate from North East, Penn.

24680. To establish on **sand and gravel** (See Note 3) from Miamiville, O., to Ohio points.

N. & W. des.—	Pres.	Prop.	N. & W. des.—	Pres.	Prop.
Gernon	85	70	Seaman	(a)	90
Batavia	85	70	Peebles	(a)	95
Afton	85	75	Beaver Pond	(a)	100
Mt. Oreb	85	80	Otway	(a)	100
Macon	(a)	85	McDermott	(a)	105
Winchester	(a)	90	Portsmouth	(a)	115

(a) Classification basis.

24681. To establish on **sand and gravel** (See Note 3) from Kaley Pit (South Bend), Ind.

To—	Proposed
Furnessville, Ind.	80
Porter, Ind.	85
Crisman, Ind.	85
Willow Creek, Ind.	85
East Gary, Ind.	90
Grand Beach, Mich.	82
New Buffalo, Mich.	87
Three Oaks, Mich.	87

Present—Classification basis. Route—Via Michigan City, Ind.

24682. To establish on **sand** (all kinds) and **gravel** (See Note 3), Wapakoneta, O., to Coldwater O., rate of 70c per net ton. No switching will be absorbed at Wapakoneta, O. Present—Sixth class, 10½c.

24683. From C. F. A. territory to Official Classification Territory, except Canada. To establish on **sand and gravel** (See Note 3) from Seymour, Ind., to Indiana points:

	Prop.	Pres.		Prop.	Pres.
Mitchell	$0.70	$1.27	Medora	0.60	0.81
Rivervale	0.70	0.92	Vallonia	0.60	0.81
Tunnelton	0.70	0.92	Brownstown	0.60	0.81
Ft. Ritner	0.65	0.92	Bedford	0.85	1.27
Sparksville	0.65	0.81			

24686. To establish on **stone, crushed and crushed stone screenings, limestone, agricultural (not ground or pulverized) and stone tailings**, in bulk, in open top cars (See Note 3), from C.F.A. Territory to Official Classification Territory, except Canada, from Narlo, O.

To N. K. P. Stations—	Proposed
Waynedale, Ind.	$1.15
Ferguson, Ind.	1.15
Yoder, Ind.	1.15
N. Y. C. Stations.	
Butler, Ind.	1.30
Twin Lakes, Ind.	1.50
Vistula, Ind.	1.45
Seyberts, Ind.	1.50
C. C. C. & St. L. Stations.	
Selver Lake, Ind.	1.45

Present—Sixth class.

24688. To establish on **crushed stone**, Keeport, Ind., to Toledo, O. Rate of $1.35 net ton. Route—Via Wabash Ry. direct. Present—$1.61 net ton.

24689. To establish on **sand**, all kinds and **common or lake gravel** (See Note 3), to Jackson, O. Rates in cents per ton 2000 lb.

From—	Proposed	Present
Columbus, O.	*80	300
Chillicothe, O.	*70	240

*When in box cars see Note 1 of Tariff, Tariff Authorities.

24700. To establish on **crushed stone**, carloads, Carey, O., to North Randall, O., rate of 90c net ton. Route—Via Northern Ohio Ry.-Copley Jct. O.-A. C. & Y. Ry.-Akron, O.-Erie R. R. Present—110c net ton (Cleveland rate).

24701. To establish on **common sand and gravel**, carloads, from Leeland, Ind., to Defiance, O., rate of 88c per ton of 2000 lb. Present—90c per ton of 2000 lb.

24704. To cancel present rates shown in Exhibit B attached on **sand and gravel**, carloads, from Gravel Pit, O., to points in Kentucky, permitting combination rates to and from Cincinnati, O., to apply in lieu thereof.

EXHIBIT "B"

Sand and Gravel, Carloads (Rates in Cents Per Ton of 2000 Lb.), From Gravel Pit, O.

To (Rep. Points)	Present rate (Proposed to cancel)	Combination—To Cincinnati, O.	Combination—From Cincinnati, O.	Through rate
Anchorage, Ky.	150	50	100	150
Brannon, Ky	144	50	100	150
Corinth, Ky.	122	50	80	130
Duckers, Ky.	150	50	110	160
Falmouth, Ky.	110	50	70	120
Frankfort, Ky.	150	50	110	160
Hinton, Ky.	122	50	80	130
Lexington, Ky.	150	50	100	150
Nicholasville, Ky.	150	50	100	150
Paris, Ky.	150	50	110	160
Richwood, Ky.	99	50	55	105
Scotts, Ky.	160	50	110	160
Shelbyville, Ky.	160	50	110	160
Turners, Ky.	140	50	90	140
Walton, Ky.	100	50	60	110
Winchester, Ky.	150	50	100	150

24707. To establish on **crushed stone**, in bulk, in open top cars, from Lima, O.

To—	Present	Proposed
Stryker, O.	6th Class	95
Bryan, O.	6th Class	100
Melbern, O.	6th Class	100
Edgerton, O.	6th Class	105

24711. To establish on **sand, viz.: Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica**, carloads, Beaumont, O., to points in Central Freight Association territory, same rates as in effect from Enterprise group (Enterprise and Sugar Grove, O.).

(Representative points)	—Proposed— Interstate	Intrastate
Buffalo, N. Y.	277	......
Pittsburgh, Penn.	202	......
Cleveland, O.	180	156
Columbus, O.	101	70
Fort Wayne, Ind.	239	......
Indianapolis, Ind.	277	......
Louisville, Ky.	277	......
Chicago, Ill.	252	......
Springfield, Ill.	315	......
Cairo, Ill.	441	......
East St. Louis, Ill.	328	......

Present—Official classification basis.

24712. To establish on **crushed stone**, in bulk, in open top cars, carloads, Greenfield, O., to Dayton, O., rate of 90c per ton of 2000 lb. Present—Sixth class.

24713. To establish on **sand** (all kinds) and **gravel**, carloads, Barr, Beach City and Dundee, O., to Strasburg, O., rate of 70c per ton of 2000 lb. Route—Via W. & L. E. Ry., Justus, O., B. & O. R. R. Present—90c per ton of 2000 lb.

24715. To establish on **sand and gravel**, carloads, from Urbana, O. Rate per net ton:

To—	Prop.	Pres.
South Charleston, O.	70	80
South Solon, O.	75	80

Via C. C. C. & St. L. Ry., Springfield, O., and D. T. & I. R. R.

24716. To establish on **crushed stone and crushed stone screenings, etc.**, carloads, from Muncie, Ind., to Indiana points:

	Pres.	Prop.		Pres.	Prop.
New Castle	70	60	Connersville	*	75
Tipton	*	70	Spiceland	*	65
New Lisbon	*	65	Dunreith	*	65
Cambridge City	*	70	Mays	*	70
Milton	*	70	Sexton	*	70
Beesons	*	70	Rushville	*	75

24722. To establish on **crushed stone**, carloads, Sibley, Mich., to Detroit, Mich., rate of 44c per ton of 2000 lb. Present—54c per ton of 2000 lb.

24727. To establish on **sand and gravel**, carloads, New Albany, Ind., to Norris and Salem, Ind., rate of 70c net ton. Present—75c net ton.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

19640. To provide switching charge of $15 per car on **limestone** at West Stockbridge, Mass. Reason—To provide a charge for a necessary switching service.

TEXAS-LOUISIANA TARIFF BUREAU DOCKET

S-2847-LA. **Sand and gravel**, carloads, between West Monroe, La., and points in Louisiana. Proposition from carriers to establish Monroe rates on sand and gravel, carloads, between West Monroe, La., and points in Louisiana.

SOUTHERN FREIGHT ASSOCIATION DOCKET

50149. **Crushed** stone, from Boxley, Va., to Southern Ry. Richmond Division stations. It is proposed to publish rates on crushed stone, carloads (See Note 3), on basis of the trunk line scale prescribed by the Interstate Commerce Commission in Docket 17517, from Boxley, Va., to Southern Ry. stations between Clarksville and Keystone, Va., not including Clarksville and Danville, to West Point, Va., not including Danville, for intrastate application.

50249. **Sand and gravel**, from Johnsonville and Perryville, Tenn., to Fowlkes, Tenn. It is proposed to establish reduced intrastate rate of 125c per net ton on sand and gravel, in straight or mixed carloads (See Note 3), from and to above named points, based on the 17517 scale for the actual distance.

SOUTHWESTERN FREIGHT BUREAU DOCKET

19992. **Sand and gravel** between West Monroe, La., and points in Arkansas. To apply the single line distance scale of rates on sand and gravel, carloads, description and minimum weight as per S. W. L. Tariff No. 162A, between West Monroe, La., on the one hand, and Arkansas points on the Mo. Pac. R. R. and L. & A. Ry. on the other. West Monroe is a local station on the Y. & M. V. R. R. approximately six-tenths of one mile west of Monroe, La. In connection with group and specific rates the same rates usually apply to both points. Shippers at Monroe contend that they should enjoy Monroe rates on this traffic. In I. C. C. 17000, part 11 (155 I. C. C. 280), the commission considered this situation but left it to the carriers to adjust.

WESTERN TRUNK LINE DOCKET

6270-A. **Sand and gravel, filtered**, carloads (See Note 3), from Muscatine, Ia., to Detroit, Mich. Present rate, $3.28 per net ton; proposed, $3.06 per net ton.

7215. **Sand**, carloads (See Note 2), but not less than 40,000 lb., from Wedron, Ill., to Farber, Mo. Present rate, $2.80 per ton; proposed, $2.40 per ton.

7220. **Stone, crushed**, carloads (See Note 1), but not less than 50 net tons, from East St. Louis, Ill., to O'Fallon, Mo., and the following intermediate points: Bonfils, Mo., Elin Point, Mo., St. Charles, Mo., St. Peters, Mo., Sands, Mo. Present rates, $1.49 per net ton, based 2c per 100 lb., minimum $10 per car from East St. Louis, Ill., to St. Louis, Mo., and the interstate mileage rate of $1.09 per net ton from St. Louis, Mo., to O'Fallon, Mo.; proposed, $1.01 per net ton.

1564-W. **Stone, crushed**, carloads (See Note 2), but not less than 50,000 lb., from Dell Rapids and Sioux Falls, S. D., to Ortonville, Minn. Present rate, 13½c (distance basis); proposed, 10c.

1564-X. **Stone, crushed**, carloads (See Note 3), but in no case shall the minimum weight be less than 50,000 lb., from Dell Rapids and Sioux Falls, S. D., to Lakefield and Jackson, Minn. Present rate, 8½; proposed, 6½c.

2556-N. **Sand and gravel**, (See Note 3). In no case shall the minimum weight be less than 40,000 lb., from Browntown, Wis., to Kansas City, St. Joseph, Mo., Omaha, Neb., Sioux City, Ia., Sioux Falls, S. D., and stations taking same rates in W. T. L. Tariff 1R. Present rates, Class E rate to stations on connecting lines and interstate distance tariff commodity rates to single line points; proposed, 15½c per 100 lb.

7227. **Stone, crushed, ground or broken**, from (a) Chicago, Springfield, Danville, Ill., and St. Louis, Mo., groups; (b) Bluff Hall, Fall Creek, East Hannibal, Marblehead, Quincy, Ill., and Hannibal, Mo., to (a) Winona, Minn., La Crosse, Wis., groups; (b) Kansas City and St. Joseph, Mo., groups. Description: Present—As per Items 4250E and 4253A, W. T. L. Tariff 1R and Item 1120 W. T. L. 7-O, stone, crushed. Proposed—Amend the description of the above items to read, stone, crushed, ground or broken.

1564-Y. **Stone, crushed**, usual minimum weight, from Dell Rapids, S. D., to Creston, Ia., via Sioux City, Ia., and C. B. & Q. R. R. Present rates, 12c; proposed, 11c per 100 lb.

2556-O. **Sand**, classified as taking Class E rate in Western Classification, sand pit strippings (See Note 3), from Browntown, Wis., to Denver, Colo., and Groups B, C and D, pages 24 to 27, inclusive, of E. B. Boyd's Tariff 111 series. Rates: Present —43½c per 100 lb. Proposed, 34½c per 100 lb.

7220. **Stone, crushed**, carloads (See Note 1), but not less than 50 tons of 2000 lb., from Krause, Ill., to O'Fallon, Mo., and the following intermediate points: Bonfils, Elm Point, St. Charles, St. Peters and Sands, Mo. Present rates, $1.59 per ton of 2000 lb.; proposed, $1.11 per ton of 2000 lb.

3089-I. **Limestone, crushed or ground**, carloads (See Note 3), but not less than 40,000 lb., from Centerville, Ia., to Omaha, Neb. Present rate, 13c per 100 lb. plus $6.30 per car; proposed, $1.80 per net ton.

7235. **Sand**, carloads (See Note 2), except that when actual weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will be the minimum weight. In no case shall the minimum weight be less than 40,000 lb., from Berlin, Browntown, Milwaukee, Portage and Rush Lake, Wis., to Fort Dodge and Waterloo, Ia. Rates:

From Browntown, Wis., Milwaukee, Wis., to Ft. Dodge, Ia. Present, 16c; proposed, 11c.

From Berlin, Wis., Browntown, Wis., Milwaukee, Wis., Portage, Wis., Rush Lake, Wis., to Waterloo, Ia. Present, 12c; proposed, 11c.

TRANSCONTINENTAL FREIGHT BUREAU DOCKET

11009. **Silica sand**, carloads. Request for carload rate of 40c per 100 lb. minimum weight of 100,000 lb., on **silica sand**, from group "D" to the Pacific coast, under Item 4860 of Tariffs 1-G (I. C. C. Nos. 115, A262, 2213 and 1224 of Frank Van Ummersen, W. S. Curlett, B. T. Jones and H. G. Toll, Agents, respectively) and 4D (I. C. C. Nos. 120, A272, 2232 and 1230 of Frank Van Ummersen, W. S. Curlett, B. T. Jones and H. G. Toll, Agents, respectively); proposed basis to alternate with present bases.

ILLINOIS FREIGHT ASSOCIATION DOCKET

3222-B. To establish commodity rate of $4.15 per net ton on **sand, silica, ground or pulverized**, carloads (See Note 1), except when car is loaded to full visible capacity actual weight will govern, from Ottawa, Ill., to Chattanooga, Tenn.

4608. **Silica sand**, carloads, washed or processed, from Browntown, Wis., to Ohio River crossings applicable on traffic to destinations in Carolina and southeastern territories. Present rate, combination; proposed, $2.70 per net ton.

5580-A. **Sand and gravel**, carloads (See Note 3), but not less than 40,000 lb., from Hannibal, Mo., to East Hannibal, Shepherds, Aladdin and Spencers, Ill. Present rate, 76c; proposed, 63c per net ton.

Mica Rate Revision

A LIMITED revision of rates on wet and dry ground mica and scrap or crude mica from points in Virginia and North Carolina has been recommended by Examiner E. L. Glenn in No. 22192, J. B. Preston Co., Inc., et al. vs. C. C. and O. et al., No. 22263, Richmond Mica Corp. vs. A. C. and Y. et al., No. 22225, U. S. Mica Manufacturing Co. vs. C. C. and O. et al., and I. and S. No. 3346, ground mica from Richmond, Va., to central territory.

In the title complaint it was alleged that the rates on wet and dry ground mica from Spruce Pine, Penland and Franklin, N. C., to various points throughout the United States and Canada were unreasonable; also that the rates on mica schist from Spruce Pine and Penland were unduly preferential of shippers of such products at those points and unduly prejudicial to shippers of dry ground or wet ground mica; and that the rates on wet ground mica from Richmond, Va., to destinations in Ohio, Indiana and Michigan were unduly preferential of shippers from Richmond and unduly prejudicial to shippers of that commodity from Spruce Pine.

In No. 22263, Richmond Mica Corp. vs. A. C. and Y. et al., it was alleged that the rates on ground or pulverized mica from Richmond to destinations in Maryland, Pennsylvania, New Jersey, New York, Massachusetts, Canada, Wisconsin, Michigan, Illinois and Ohio were unreasonable. In the U. S. Mica Manufacturing Co. complaint, it was alleged that the rates on scrap mica, suitable for grinding, from Spruce Pine and Franklin to its plants at Forest Park, Ill., and Rutherford, N. J., were unreasonable.

The schedules in the suspension proceeding proposed to restrict the application of the commodity rates on ground mica from Richmond to central territory so as to have them apply only on dry ground mica. That change would result, said Glenn, in the application of fifth class rates on wet ground mica the same as applied from Richmond to all other destinations. In disposing of the cases, Glenn said:

"Upon consideration of all the facts of record in this case, the commission should find (1) that the rates on wet and dry ground mica and scrap or crude mica from points in Virginia and North Carolina to destinations in official and southern classification territories and other points in the United States and Canada are not unreasonable or otherwise unlawful except, to the extent the rates on wet ground mica from Spruce Pine and Penland, N. C., to points in trunk-line and New England territories exceed the contemporaneously maintained rates on wet ground mica from Richmond, Va., to that same territory by more than 10 cents per 100 lb., and (2) that suspended restriction in the application of commodity rates on ground mica from Richmond, Va., to destinations in central territory is justified.

"An appropriate order should be entered vacating the suspension proceeding, and following compliance with the findings herein made, dismissing complaints in the other dockets in these cases."—*The Traffic World.*

Deny Rate Increase on Sand and Gravel from Nebraska

THE state railway commission denied an application of all Nebraska railroads for a change in the sand and gravel rate schedule that would have resulted in an increase in the cost of shipping.

Railroads desired to cancel absorption of all switching charges at origin points, which rule is in effect at present, and to substitute for it the joint line rate which is in effect for joint line movement. This rate involves an additional charge of 1 cent a cwt. or $10 a car on the average car of sand and gravel.

South Dakota Orders Cut in Crushed Stone Rates

REDUCTIONS in carload rates on sand, gravel, crushed and broken stone and riprap, on South Dakota intrastate traffic, ranging from 6 cents to 70 cents per ton for single line hauls, and from 6 cents to 85 cents per ton for joint line hauls, have been ordered by the South Dakota board of railroad commissioners. Exhibits offered by various organizations showed that charges in South Dakota were higher than those in North Dakota, Minnesota, Iowa, Nebraska and Wisconsin.

Tariff on Cement Accepted by House of Representatives

IN the first separate votes on items of the conference upon the tariff bill, the U. S. House of Represenatives on May 1 practically unanimously accepted the Senate's lower duty of 6 cents a hundred pounds on cement, and by 221 to 167 rejected the provision to exempt from duty importations of the commodity for use in public construction.

Forty-five of the votes in favor of the public construction proviso in the cement tariff item were cast by Western and Northwestern Republicans. The provision, they conceded, would practically nullify the cement tariff, and this was what they sought.

Representative Ramseyer of Iowa, a leader of the farm bloc, said the proviso was the last weapon by which "Congress could keep the cement monopoly halfway decent."

"The United States Steel Corp. is going into the cement business," Mr. Ramseyer said. "They have recently acquired the Atlas Portland Cement Co., with an output of 19,000,000 bbl. a year, and already own or control the Universal Portland Cement Co., with an output of 17,000,000 a year. This is 21% of the output of the entire United States.

"Investigate the experiences of the municipalities and you'll see how the cement companies, with a community of understanding, are absolutely fixing the price of the commodity.

"Here we are building to help things. But here we come along with a proposal to increase the price of the essential building material, and the only excuse for the tariff is the threat of the little importation of 1.01% of our production. Withdraw that threat and you'll give the cement monopoly authority to go the limit."

Representative La Guardia asserted that the cement duty would affect "every rent payer and every subway rider in my city of New York." He said New York was engaged in a $600,000,000 subway building program and was interested in keeping cement duty-free as at present.

Most of the New York City Representatives were among the twenty-nine Democrats who voted against the proviso. Others included Representatives from sections of the South where several cement plants are located.

Representative Parker, Republican, of New York, argued that the benefits sought for various state, county and municipal governments in duty-free cement would not be effective more than 200 miles from the Atlantic Coast because of freight rates. Representative Fort of New Jersey brought up the alleged threat of the Belgian cement industry. Representative Lehlback of New Jersey argued that it was the "patriotic duty of every American citizen" to patronize home industries.

Republicans who joined with the majority of Democrats in favor of the duty-free proviso on public construction were:

Andresen, Christgau, Clague, Goodwin, Knutson, Mass, Nolan and Selvig of Minnesota; Browne, Cooper, Frear, Hull, Kading, Nelson, Peavey, Schnider and Stafford of Wisconsin; Campbell, Dowell, Kopp, Ramseyer, Robinson, Swanson and Thurston of Iowa; Christopherson, Johnson and Williamson of South Dakota; Hall and Sinclair of North Dakota; Craddock, Kendall, Langley and Walker of Kentucky; Garber and O'Connor of Oklahoma; Hoch, Hope, Lamberton, Sparks and Sproul of Kansas; Brand of Ohio, Hull of Illinois, La Guardia of New York, Walsh of California and Summer of Washington.

The twenty-nine Democrats who left the party ranks were:

Black, Boylan, Carley, Celler, Corning, Cullen, Dickstein, Fitzpatrick, Gavagan, Kennedy, Lindsay, Meade, O'Connell, O'Connor, Prall, Quayle and Sullivan of New York; Byrns, Fisher and McReynolds of Tennessee; Green and Mrs. Owen of Florida; O'Connor and Spearing of Louisiana; Granfield of Massachusetts, Hill of Washington, Igoe of Illinois, Tucker of Virginia and Smith of West Virginia.—*New York* (N. Y.) *Times*.

Activity at Three Forks (Mont.) Cement Plant

THE Three Forks Portland Cement Co. resumed operations at full capacity May 1, according to Clark F. Leh, superintendent. Mr. Leh stated that the maintenance crew have overhauled the equipment of the entire plant since it closed last July.

The Trident plant was built in 1910, with Frank Fisher as first superintendent. He was succeeded by Helmuth Krarup and later E. U. Leh, father of the present superintendent, Clark F. Leh. E. U. Leh retired three years ago after a very successful record at the Trident plant and now resides in California.

Trident, Mont., the home of the Three Forks Portland Cement Co., is about six miles northeast of Three Forks on the main line of the Northern Pacific railroad and within a quarter of a mile of the headwaters of the Missouri river. Trident is a company owned municipality and one of the most prettily laid out of any town in the state. All of the houses, built by the company, are of concrete with attractive grounds and shade trees. There are 41 modern homes, six apartments, a hotel, store, pool hall and theater. In addition to these company owned homes and business houses there is a grammar school and teacherage, considered among the most modern in the state. Everywhere trees and lawns have been planted and the entire town and industrial plant is clean and sanitary. Last year about 60 trees were planted and considerable money spent for municipal improvements.

Officials of the company have joined wholeheartedly in the national industry "safety" movement.—*Three Forks* (Mont.) *Herald*.

Producers of Sand, Gravel and Stone Have a Friend in U. S. Senate

A LETTER from Senator Brock of Tennessee, to Walter H. Newton, secretary to President Hoover, relating to rates on building materials involved in I. and S. No. 3250, sand, gravel, slag, stone and chert between, from and to points in Mississippi Valley territory, was transmitted to Chairman McManamy, of the Commission, by Mr. Newton, it has been revealed by the correspondence in the docket in the case.

"I do not want to bother the President with too many things," wrote Senator Brock to Mr. Newton, "but I have just received a copy of a telegram sent to him by Governor Horton, of Tennessee, as to the Interstate Commerce Commission considering freight rate increase on building materials in Tennessee, Louisiana and Mississippi, and it does look like this is a bad time to do that, and especially in that particular section when these states are trying to carry out Mr. Hoover's building program. If there is anything you can do, and if you think best, speak to the President about it, as I think it is worthy of consideration, any anything you do in this connection will be highly appreciated by me. With the assurance I would not ask this if I did not think it was an entirely just complaint, I am cordially yours, etc."

Mr. Newton sent the following letter to Chairman McManamy:

I am enclosing letter from Senator W. E. Brock of Tennessee, which explains itself and is submitted for careful attention and consideration.

Chairman McManamy replied that Senator Brock apparently had reference to rates proposed by carriers suspended in I. and S. No. 3250; that the proceedings had been fully heard, that briefs had been filed, that all those interested had been heard in oral argument, that the case now stood submitted and that a decision would be reached as soon as possible "on the record made before the Commission."

A similar letter was written to Senator Brock by Chairman McManamy except that the letter to the Senator included the following:

For your information, I will say that the proposed rates are based on a distance scale which applies generally throughout the southeast, and while the application of that scale would increase many rates in the Mississippi Valley, its application has or would bring about many reductions from and to other points in Tennessee and elsewhere.

Senator Brock also was advised by Chairman McManamy that a decision would be reached in due course "on the record made before the Commission."

The rates involved were recently made the subject of day-to-day attacks in the Senate by Senator McKellar, of Tennessee.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Manufacture of Art Objects of Colored Cement

Part VI—Magnesite Cement Art Objects

By George Rice
Palo Alto, Calif.

ARTISTRY in magnesite cement and metal is somewhat different in technical detail from artistry in portland cement and metal. Magnesite cement is a very hard, marble-like plastic medium which is being advantageously used in unison with metal in a line of molded objects of great durability. Builders have long used industrial magnesite cement for floor tiles, bathroom walls, coatings for stairways and like purposes because of its smooth texture, gloss and fireproof qualities. It is now being successfully used as a ground for tiles and architectural objects in which the design is produced with metal. The substances for producing the type of magnesite cement best adapted for use with metal are calcined powdered magnesite, chloride of magnesia and white talc. The batch is mixed in a box similar to the one shown in Fig. 1, or for tryout purposes, a small mix can be made in a pail. It comprises powdered magnesite 4 parts, pulverized silica of about 150-mesh, 3 parts and white talc, 1 part. Mix well while the substances are still dry, using a wooden paddle or mixer such as are shown in Fig. 1.

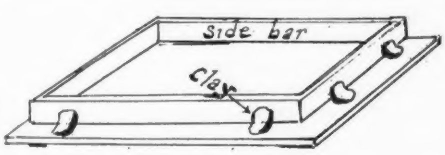


Fig. 2. The casting mold

If it is desired to have the mixture colored, any dry mineral color or colors can be added at this time. About 1 part color to 3 parts of the magnesite mixture will be right.

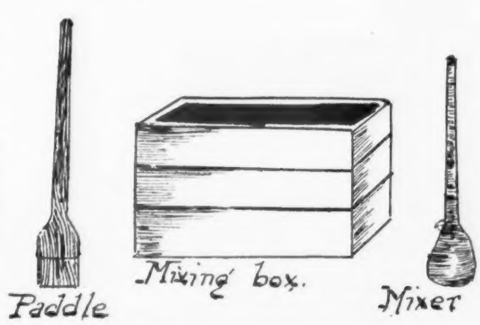


Fig. 1. Box, paddle and mixer used for mixing magnesite cement

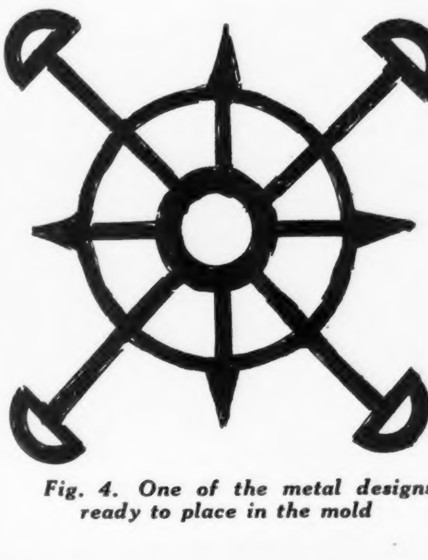


Fig. 4. One of the metal designs ready to place in the mold

Next comes the addition of what is known as the wet or liquid mixture, which consists of 5 parts by weight of chloride of magnesia solution, the density of which should be about 22 deg. Bé. The final mixture is made by adding this liquid solution to the first dry mixture in sufficient quantity to get a rather heavy creamy result. It should be so that it will pour easily without being too thin.

Pouring the Mixture Into the Mold

A casting mold can be made by setting side bars on a smooth metal, glass or wood surface and holding them in place with clay pads as shown in Fig. 2. The procedure is much like casting ordinary color or plain portland cement objects. The mold is filled with the magnesite cement as shown in Fig. 3, the usual precautions of greasing the surfaces of the mold having been taken to facilitate the lifting of the tile when the magnesite mixture has properly hardened. But before actual hardening takes place the metal designs have to be sunk in. A metal design as shown in Fig. 4 is placed on top of the soft magnesite mixture and this settles down into mass of its own weight. The still plastic material will find its own level in the interstices of the metal design, and when hardened there a solid and strong tile

Fig. 3. Mold filled with magnesite cement

Fig. 5. A magnesite cement tile containing a metal insert

will be the resulting product.

Instead of pouring the magnesite mixture first, the metal object can be placed in the empty mold and then the magnesite mixture poured in. In some cases it is desired that the metal show on both sides of the tile, in which case the metal ornament is made as shown in Fig. 4 or in any shape or design desired, and as thick through as the tile. An endless variety of forms can be wrought or cast from the different metals for this purpose. A magnesite tile containing a single metal insert of this kind is shown in Fig. 5. Some tiles are provided with one large metal insert like this, or a number of small inserts. There is not much finishing required for this type of tile. Some common floor wax rubbed over the surface of the tile will polish both the magnesite and the metal sufficiently to produce an acceptable finish.

Selling Concrete Tile by Demonstration

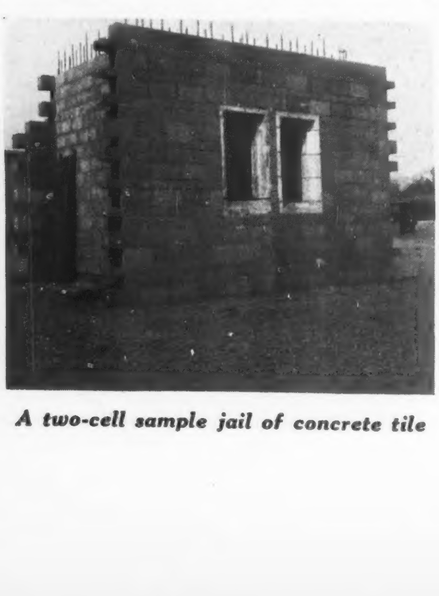
THE BERKS PRODUCTS CORP. has one operation known as the Berks Cast Stone Co., at Reading, Penn. In connection

Front view of sample jail made of tile

with its crushed-stone plant the company has a unit manufacturing concrete tile.

Recently the city of Reading considered the erection of a new jail, and in an effort to sell the city on the idea of using cast concrete units in the construction of this jail the Berks Cast Stone Co. conceived the idea of building a two-cell sample jail to demonstrate the use of its product.

The sample jail is shown in the accompanying illustration. It was built near the



A two-cell sample jail of concrete tile

plant and shows the method of construction, using reinforced rods and with window trims, etc. Colored samples of tile were also on display. This method of selling by demonstration obviously need not be confined to jails, but can be used for selling concrete tile or other plant products for any purpose.

York, Penn., Has New Ready-Mix Plant

THE YORK CONCRETE CO., Girard avenue, York, Penn., begun its first operations recently. The plant is the largest ready-mixed concrete plant in this section of the country. The ingredients of the concrete, stone, sand and cement are placed in a large 280-ton storage bin, weighed and mixed with the proper amount of water and then put into a rotary mixer. From this mixer the concrete is conveyed to trucks with revolving tanks and hauled to its destination. Through the whole process of making the concrete a representative from the E. L. Conwell Co. of Philadelphia, engineers, chemists and inspectors, is present and makes tests and verifies the quality and quantity of the cement. This representative is held responsible for the condition of the cement so that no mistake is made in regard to the quality and quantity of the cement. The plant has a capacity of 650 cu. yd. of cement every 10 hours and after a job is started the concrete is never stopped pouring until the work is completed. The general manager of the plant is Edwin Hively, Jr.—*York* (Penn.) *Gazette*.

Contractors Push Credit Policies

DETERMINATION to establish sound credit and merchandising structures for the entire construction industry was the keynote of the semi-annual executive board meeting of the Associated General Contractors of America, held in Washington, D. C., recently, at which a number of far-reaching policies designed to raise the business and professional standards of the contractor were approved.

High government officials, including Secretary of Commerce Robert P. Lamont; Major-General Lytle Brown, chief of the Corps of Engineers, and Thomas H. MacDonald, chief of the Bureau of Public Roads, in addresses to the board members signified their whole-hearted approval and satisfaction in specific portions of the program being undertaken by the Associated General Contractors and promised continuation of their co-operation in efforts to stabilize the industry.

One of the outstanding accomplishments of the meeting was the drafting and approval of a co-ordinated credit plan for all divisions in the construction field, with special application to building and to highway and engineering construction. The plan provides for a national interchange system of contract information through the Bureau of Contract Information, Inc., a co-operative enterprise launched last August as a result of representations made to the industry by the Associated General Contractors. The board also approved the proposal for a meeting of the allied building industries for the purpose of establishing a co-ordinated and uniform plan of national scope for local credit associations to serve the building construction branch of the industry.

Approval also was given to the proposed fair trade practices formulated by the Allied Construction Industries Committee as a basis for the development of fair trade practice rules for the entire industry, to be adopted in conjunction with the approval of the Federal Trade Commission.

The association's advocacy of prequalification of prospective bidders on contracts before accepting bids was given strong support by Mr. MacDonald, chief of the Bureau of Public Roads, in his address before the board. He declared that since the inauguration of the prequalification program in his bureau, the number of defaulting contracts have been reduced 83⅓%. Mr. MacDonald declared that there can be no competition helpful to the public that is based on a system which pits an inefficient contractor against an efficient one, and that prequalification is the most effective agency for the elimination of unwise competition.

Definite plans to promote future co-operation between manufacturers of equipment and contracting users of equipment through affiliated bureaus of the Associated General Contractors also were announced by the board. Col. George B. Walbridge, of Detroit, and E. J. Harding, assistant general manager of the association, advised the board that substantial progress has been made toward establishment of more equitable merchandising policies as a result of a joint conference between them and representatives of the National Builders' Supply Association and manufacturers of cement.

The dictum that private contracts with the United States Government should redound to the benefit of both parties was laid down by Major-General Brown in his talk before the board, and he assured the contractors that, so far as possible, expenditures of the current $100,000,000 rivers and harbors appropriation will be made by contract rather than by the utilization of day labor. A resolution submitted by Richard Hopkins, of Albany, N. Y., chairman of the resolutions committee, expressed the association's appreciation of General Brown's co-operation and was adopted by the board.

At the conclusion of the three-day parley, President A. E. Horst, of Philadelphia, Penn., and Rock Island, Ill., declared that its accomplishments would have far-reaching effect on the efforts of organized contractors to place their industry on a higher plane and to stabilize its condition. The next annual convention of the Associated General Contractors will be held during the week of January 25, 1931, at San Francisco, Calif., the board decided.

"Westinghouse Salute" to the Lime Industry

A SPECIAL FEATURE of the annual convention of the National Lime Association to be held in Chicago, Ill., June 3 and 4, will be the Westinghouse radio salute to the lime industry. The National Broadcasting Co. will put on a 30-minute program through 33 stations, Tuesday, June 3, 10:00 to 10:30 p. m. daylight saving New York time (9:00 to 9:30 daylight time at Chicago).

In making this announcement Norman G. Hough, president and general manager of the National Lime Association, states:

"We have no comments to make about the salute. It will speak for itself the evening of June 3. We have, however, agreed to have as many lime manufacturers as possible on the air during the program, together with as many employes of the industry. This is an obligation we owe Westinghouse company, therefore we ask that you pass the word to all employes in your organization and urge them to 'listen in.' Suitable posters for office and plant will be provided for this in due course.

"The Westinghouse company has been good enough to fit this salute in with the plans of the lime industry at the time of the twelfth annual meeting of the National Lime Association in Chicago, and all manufacturers attending the convention will receive the salute as a group. Arrangements are now being made for this.

"It is to be hoped that all manufacturers attending the convention will receive the salute as a group. Arrangements are now being made for this.

"It is to be hoped that all manufacturers will receive this salute from the convention room, but to those who will be unfortunate in not being able to attend this convention, we ask that they do the needful and be on the air at their respective stations."

Oregon Portland Puts Out New Masons' Cement

THE OREGON PORTLAND CEMENT CO., Portland, Ore., has announced a new product called "Oregon Masonry Cement," said to be stimulating considerable interest. The new material is said to have a base of portland cement to which has been added ground limestone rock and "Aquagel."

In use the mason mixes one part of "Oregon Masonry Cement" with three parts sand and adds water to proper consistency. The initial setting for this is 5 or 6 hours; final setting, 8½ to 9½ hours.

"Oregon Masonry Cement" is being manufactured at the Oswego plant of the Oregon Portland Cement Co. and is sold in paper sacks weighing 65 lb. Tests of fineness, setting time, strength, etc., have been made by the Bureau of Standards, City of Portland.

A display of this cement was made at the Portland Realty and Industrial Exposition held in Portland the last week in April.

Cemento Portland Nacional S. A., Sonora, Mexico

YGNACIO SOTO, of the Cemento Portland Nacional, S. A., Sonora, Mexico, was a visitor in ROCK PRODUCTS office, May 2. He informed the editor that the news item published in ROCK PRODUCTS, April 12, p. 61, that his company had contracted with the Macdonald Engineering Co., Chicago, for the construction of its new plant was not correct; that he was then on his way to New York City to contact cement mill engineers and equipment manufacturers and to sign a contract for the construction of the new mill. The original source of the news item in ROCK PRODUCTS, April 12, was a report in the *Tucson* (Ariz.) *Citizen*.

New York State Crushed Stone Association Meeting

THE NEW YORK STATE CRUSHED STONE Association held a meeting and luncheon at the Hotel Utica, Utica, N. Y., April 25, 1930. In the absence of John H. Odenbach, president, the meeting was presided over by H. J. Russell, vice-president, and A. S. Owens, secretary.

Telegrams were read from John Rice, president of the General Crushed Stone Co., Easton, Penn., expressing regret at the inability of himself and Mr. Graves to be present, and also from James Savage, of the Buffalo Crushed Stone Co., Buffalo, N. Y., at the inability of himself and Mr. Hooker to be present.

The committee on the proposed lien law amendments reported that the law as finally passed by the legislature was now in the hands of the governor for signature and that the objectionable features had been very largely removed. A complete draft of the law as finally passed was not available but will be presented at the next meeting.

The matter of a credit interchange bureau as proposed by the New York State Highway Chapter of the Associated General Contractors of America was brought up and discussed, but no final action taken.

The committee on exchange of credit information and uniform terms of sale reported further, and following a general discussion of the subject will at the next meeting make definite recommendations.

Messrs. Heimlich and Schaefer were appointed a committee to look into and report on the matter of optional use of stone as against pea gravel in the top course of concrete roads.

Following some further general discussion the meeting was adjourned to convene again next month at the call of the secretary, the place and date to be announced later.

After adjournment an interesting trip was made by part of those present, as the guests of A. S. Owens, to the Sterling Creek plant of the Eastern Rock Products, Inc., near Utica, where some changes and improvements have been made, particularly in the addition of a Buchanan primary jaw crusher and the speeding up of the plant conveyors.

Attendance (Producers)

Adams and Duford Co., Chaumont, N. Y., E. B. Johnson.
Dolomite Products Co., Rochester, N. Y., Walter Sickles.
General Crushed Stone Co., Syracuse, N. Y., G. J. Murphy, F. C. Owens, George E. Schaefer, A. G. Seitz, W. L. Sporborg.
Jointa Lime Co., Glens Falls, N. Y., H. J. Russell.
L. and M. Stone Co., Prospect, N. Y., William McGrew.
Le Roy Lime and Stone Co., Le Roy, N. Y., J. L. Heimlich.
Eastern Rock Products, Inc., Utica, N. Y., R. M. Kelley, A. S. Owens, H. V. Owens.
Solvay Sales Corp., Syracuse, N. Y., J. H. Kaiser.

Rationalization in the Norwegian Cement Industry

AT A MEETING of the Polytechnic Society (Polyteknisk Forening) at Oslo on December 10, 1929, A. Holter, manager of the Dalen Portland Cement Works, spoke on the position of the cement industry.

Mr. Holter began with a brief survey of the development of the industry throughout the world since 1880, when the total output was only 1,400,000 tons, as compared with 70,000,000 tons at the present day. Europe, he said, produces about 31,500,000 tons, of which Norway is responsible for 350,000, though her potential capacity is 30% more.

The Norwegian cement industry suffered severely through the hasty stabilization of the crown. Thorough rationalization offered the only hope of escaping disaster. Commercial rationalization was effected conjointly by all the Norwegian works, which set up a central sales office for the three factories in southern Norway. These southern works also made a number of sales contracts with the factory in the north.

Rationalization on the technical side was carried out by each works independently.

The results, so far as the Dalen works are concerned, are evident statistically; in 1920, 450 workers produced 70,000 tons, while in 1928, 225 workers produced 154,350 tons. This achievement was not unattended by difficulties; there where strikes which lasted 42 weeks, but the output per man is now 686 tons, as against 155.75 tons in 1920.

A great saving has been effected through the use of paper bags instead of barrels and jute bags. When Mr. Holter introduced paper bags to the Norwegian market in 1926, he met with opposition. Nowadays customers have no desire for any other form of packing, and Norway dispenses with imports amounting to 4000 standardized barrel-staves and about 1,500,000 jute sacks yearly, these being replaced by stout Norwegian paper.

More than half Norway's cement output is for export. The industry pays out over 3,000,000 crowns a year in wages, and uses more than 6000 hp. of hydraulic power, produced in Norway. It also spends some 3,700,000 crowns on freights.—*Norges Handels of Sjofartstidende, Oslo,* December 11, 1929.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.	.48	.48	1.15	1.25	1.40	....
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.25	1.15	1.75	....	1.75	1.75
Buffalo, N. Y.	1.00	1.05	1.05	1.05	1.05	1.05
Burnside, Conn.	.75*	.75*	....	....	....	....
Erie, Penn.	.75	.95	1.40	1.40	....	....
Machias Junction, N. Y.	.65	.65	.65	....	.65	.65
Milton, N. H.	....	....	1.75	....	1.25	1.00
Montoursville, Penn.	1.00	.60	.50	.50	.50	.40
Northern New Jersey	.50	.50	1.00–1.25	1.00–1.25	1.00–1.25	....
South Portland, Me.		1.25	2.75	2.50	2.50	2.50
Washington, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.60	.30	.30	.40	.40	.40
Appleton, Minn.		.50	1.25	....	1.50	....
Attica, Ind.	All sizes .75–.85					
Barton, Wis.	....	.40	.50	.60	.60	.60
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Crystal Lake, Ill.	.30	.15	.25	.30	.30	.40
Des Moines, Iowa	.40–.60	.60–.80	1.50–1.70	1.50–1.70	1.50–1.70	1.50–1.70
Eau Claire, Wis.	.40	.40	.55	.85	.85	....
Elkhart Lake and Glenbeulah, Wis.	.60	.30	.50	.50	.50	.50
Grand Rapids, Mich.		.50		.80	.80	.70
Hamilton, Ohio	.65–.75	65.–.75	.65–.75	.65–.75	.65–.75	.65–.75
Hersey, Mich.		.50		.70	.70	.70
Humboldt, Iowa	.40–.50	.40–.50	1.10–1.30	1.10–1.30	1.10–1.30	1.10–1.30
Indianapolis, Ind.	.50.–.60	.25–.60	.40–.60	.45–.75	.45–.75	.45–.75
Kalamazoo, Mich.		.80		1.10	1.10	1.10
Kansas City, Mo.	.70	.70	....	....	....	....
Mankato, Minn.	.55	.45	1.25	1.25	1.25	....
Mason City, Iowa	.50	.50	.85	1.25	1.25	1.25
Milwaukee, Wis.	.91	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.35	.35	1.25	1.35	1.35	1.25
St. Paul, Minn. (e)	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Urbana, Ohio	.65	.55	.65	.65	.65	.65
Waukesha, Wis.	....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.40	.40	....	....	....	....
Charleston, W. Va.	.70	1.25	1.25	....	....	....
Eustis, Fla.	....	.40–.50	....	....	....	....
Fort Worth, Texas	.75	.75	1.00	1.00	1.00	1.00
Knoxville, Tenn.	.85	1.00	1.20	1.20	1.20	1.20
Roseland, La.	.30	.30	.70	.70	.60	.70
WESTERN:						
Los Angeles, Calif.	.10–.40	.10–.40	.20–.90	.50–.90	.50–.90	.50–.90
Oregon City, Ore.	3.00–3.50g	1.00–1.50	1.00–1.50	1.00–1.50	1.00–1.50	1.00–1.50
Phoenix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60	....	1.20	1.15	1.15
Seattle, Wash.	1.25*	1.25*	1.00*	1.00*	1.00*	1.25*

*Cu. yd. ‡Delivered on job by truck. (e) Prices f.o.b. N. P. Ry.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.25	....	....	4.00	....
Cheshire, Mass.	Sand for soap, 7.00–8.00					6.00–8.00	....
Eau Claire, Wis.	....	....	....	....	....	2.50–3.00	....
Elco, Ill.	Soft amorphous silica, 92%–99% thru 325 mesh, 18.00–40.00 per ton						
Kasota, Minn.	....	....	....	....	....	....	1.00
Montoursville, Penn.	....	....	....	1.35–1.60	....	....	....
New Lexington, Ohio		1.75–2.00	1.25–1.50	....	....	....	....
Ohlton, Ohio	1.75*	1.75*	....	2.00*	1.75*	1.75*	....
Ottawa, Ill.	1.25–3.25	2.25–3.50	1.25–3.25	1.25–3.25	1.25	3.50	3.50
Red Wing, Minn. (a)	....	....	....	....	1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	....

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	....	1.50
Eau Claire, Wis.	4.30	.50–1.00
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25–3.25	1.25
Red Wing, Minn.	....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	....	1.75

Glass Sand

(Silica sand is quoted washed, dried and screened)

Cheshire, Mass., in carload lots	5.00–7.00
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	2.50–3.00

Bank Run Sand and Gravel

Appleton, Minn.†	.55
Algonquin, Ill.¶ (½-in. and less)	.30
Brewster, Fla. (sand, ¼-in. and less)	.40–.50
Burnside, Conn. (sand, ¼-in. and less)	.75*
Chicago, Ill., and Grand Haven, Mich.†	.92–1.20
Crystal Lake, Ill.¶ (½-in. and less)	.25
Des Moines, Ia. (sand and gravel mix)	.60–1.05
Fort Worth, Tex.¶ (2-in. and less)	.65
Gainesville, Tex.¶ (1-in. to 2-in.)	.55
Gary and Miller, Ind.†	1.15–1.40a
Grand Rapids, Mich.¶ (1-in. and less.)	.55
Hamilton, Ohio¶ (1½-in. and less)	.50–1.00
Hersey, Mich.¶ (1-in. and less)	.50
Kalamazoo, Mich.	1.85b
Mankato, Minn.†	.70
Oregon City, Ore.—All sizes at bunkers	1.00–1.50
Pueblo, Colo.—†River run sand	.50
Winona, Minn.†	.60
York, Penn. Sand. ¼-in. and less, 1.00; 1/10-in. down	1.10

*Cubic yard. †Fine sand, 1/10-in. down. (a) Cu. yd., delivered Chicago. (b) 1½ cu. yd. ¶Gravel.

Current Price Quotations

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.92½	3.70	4.30¶
Atlanta, Ga.	....	2.19†	3.49¶
Baltimore, Md.	....	2.26†	3.56¶
Berkeley, Calif.	....	2.14	......
Birmingham, Ala	....	1.85†	3.15¶
Boston, Mass.	.47	1.88†	3.27¶
Buffalo, N. Y.	.51¼	2.05†	3.35¶
Butte, Mont.	.90¼	3.61	......
Cedar Rapids, Ia.	....	2.23*	......
Centerville, Calif.	....	2.14	......
Charleston, S. C.	....	a2.29†	3.26¶
Cheyenne, Wyo.	.71½	2.86	......
Chicago, Ill.	....	1.95*	3.25¶
Cincinnati, Ohio	....	2.14*	3.44¶
Cleveland, Ohio	....	2.04*	3.34¶
Columbus, Ohio	....	2.12†	3.47¶
Dallas, Texas	....	†1.90–2.20	3.49¶
Davenport, Iowa	....	2.14*	......
Dayton, Ohio	....	2.14†	3.44¶
Denver, Colo.	.76¼	3.05	......
Des Moines, Iowa	.48½	1.94	......
Detroit, Mich.	....	1.95*	3.25¶
Duluth, Minn.	....	2.04*	......
Fresno, Calif.	....	2.33	......
Houston, Texas	....	†2.00–2.30	3.73¶
Indianapolis, Ind.	.54¾	1.99*	3.29¶
Jackson, Miss.	....	2.29†	3.59¶
Jacksonville, Fla.	....	†2.34b	3.26¶
Jersey City, N. J.	....	2.13†	3.43¶
Kansas City, Mo.	.50½	2.02	3.22¶
Los Angeles, Calif.	.43	1.72	......
Louisville, Ky.	.55½	2.12†	3.42¶
Memphis, Tenn.	....	2.29†	3.59¶
Merced, Calif.	....	2.01	......
Milwaukee, Wis.	....	2.10*	3.40¶
Minneapolis, Minn.	....	2.27*	......
Montreal, Que.	....	1.60‡	......
New Orleans, La.	.43	1.92†	3.22¶
New York, N. Y.	.50¾	2.03†	3.33¶
Norfolk, Va.	....	1.97†	3.27¶
Oklahoma City, Okla.	.61½	2.46	3.66¶
Omaha, Neb.	.59	2.36	3.56¶
Peoria, Ill.	....	2.12*	3.32¶
Pittsburgh, Penn.	....	1.95*	3.25¶
Philadelphia, Penn.	....	2.15†	3.45¶
Phoenix, Ariz.	....	3.51	......
Portland, Ore.	....	2.50	......
Reno, Nev.	....	2.96†	......
Richmond, Va.	....	2.32†	3.62¶
Sacramento, Calif.	....	2.25	......
Salt Lake City, Utah	.70¼	2.81	......
San Antonio, Texas	....	......	3.42¶
San Francisco, Calif.	....	2.24†	......
Santa Cruz, Calif.	....	2.10	......
Savannah, Ga.	....	†2.29a	3.16¶
St. Louis, Mo.	.48¾	1.95†	3.25¶
St. Paul, Minn.	....	2.27*	......
Seattle, Wash.	....	1.75–1.90	......
Tampa, Fla.	....	2.00†	3.41¶
Toledo, Ohio	....	2.20*	3.50¶
Topeka, Kan.	.55¼	2.21	3.41¶
Tulsa, Okla.	.58¼	2.33	3.53¶
Wheeling, W. Va.	....	2.02†	3.32¶
Winston-Salem, N.C.	....	2.44†	3.54¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.	....	2.15	......
Bellingham, Wash.	....	2.25	......
Buffington, Ind.	....	1.70	......
Chattanooga, Tenn.	....	2.05	......
Concrete, Wash.	....	2.65	......
Davenport, Calif.	....	2.05	......
Hannibal, Mo.	....	1.90	......
Hudson, N. Y.	....	1.85†	......
Leeds, Ala.	....	1.65	......
Limedale, Ind.	....	1.70	......
Lime & Oswego, Ore.	....	2.50	......
Mildred, Kan.	....	2.35	......
Nazareth, Penn.	....	2.15	......
Northampton, Penn.	....	1.75	......
Richard City, Tenn.	....	2.05	......
Steelton, Minn.	....	1.85	......
Toledo, Ohio	....	2.20	......
Universal, Penn.	....	1.70	......

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. ‡Includes sales tax.

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Farmington, Conn.	....	1.30	1.10	1.00	1.00	....
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.00
Jamesville, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00
Oriskany Falls, N. Y.	.50–1.00	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35	1.00–3.00
Prospect Junction, N. Y.	.50– .80	1.15u	1.15	1.10	1.10	1.10
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Shaw's Junction, Penn. (e)	.85	1.20–1.35	1.20–1.35	1.20–1.35	1.40	1.30–1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill. (b)	2.00	....	2.00	....	....	....
Cypress, Ill.	.90	.90	.90	.90	1.00	1.15
Davenport, Iowa	1.00	1.50	1.50	1.30	1.30	1.30
Dubuque, Iowa	....	1.10	1.10	1.10	1.10	....
Dundas, Ont.	.50	.80	.80	.80	.80	.80
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	....
Greencastle, Ind.	1.25	1.10	1.10	1.00	1.00	1.00
Lannon, Wis.	.80	1.00	1.00	.80	.80	.80
McCook, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.75–1.00	1.65–1.85	1.45	1.15	1.05	.95
Sheboygan, Wis.	1.00	1.00	1.00	1.00	1.00	1.00
Stone City, Iowa	.75	....	1.10	1.00	1.00	1.00h
Toledo, Ohio	1.60	1.70	....	1.60	....	1.60
Toronto, Canada	2.50	2.50	2.50	2.50	2.50	2.50
Waukesha, Wis.	....	.90	.90	.90	.90	....
Wisconsin points	.50	....	1.00	.90	.90	....
SOUTHERN:						
Cartersville, Ga.	1.00	1.50	1.50	1.35	1.00	.90
Chico and Bridgeport, Texas	.50	1.30	1.30	1.25	1.20	....
Cutler, Fla.	.50– .75r	....	....	1.75r	....	1.10g
El Paso, Texas (v)	.50	1.25	1.25	1.00	1.00	1.00
Graystone, Ala.		Crusher run stone 1.00 per net ton				
Olive Hill, Ky.	.50–1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.10	1.25	1.25	1.25	1.00	....
Richmond, Calif.	.75	....	1.00	1.00	1.00	....
Rock Hill, St. Louis, Mo.	1.45	1.45	1.45	1.45	1.45	1.45
Stringtown, Okla.	.50	1.30	1.30	1.25	1.20	....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90–1.00	2.25	1.75	1.75	1.25	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	....	2.00	1.45	1.20	1.15	....
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	....
Northern New Jersey	1.00–1.40	2.10	1.25–1.90	1.00–1.50	1.00–1.50	....
Richmond, Calif.	.50	....	1.00	1.00	1.00	....
Toronto, Canada	4.70	5.80	4.05	4.05	....	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.50	1.60	1.60	1.60	1.50	1.50
Chicago, Ill.—Granite	2.00	1.70	....	1.50	1.50	....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.35	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.75	1.50	1.25	1.25	....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.—Granite	3.00–3.50	....	2.00–2.25	2.00–2.25	....	1.25–3.00
Toccoa, Ga.—Granite	.50	1.35	1.35	1.25	1.25	1.20

(a) Limestone, ¼ to ⅛ in., 1.35 per ton; Lime flour, 8.50 per ton. (b) Wagonloads. (c) 1 in., 1.40. (d) 2-in., 1.30. (e) Price net after 10c discount deducted. (g) Per cu. yd., 3-in. and less. (h) Rip rap. (n) Ballast, R.R., .90; run of crusher, 1.00. (q) Crusher run, 1.40; ¼-in. granlithic finish, 3.00. (r) Cu. yd. (t) Rip rap, 1.20–1.40 per ton. (u) ⅝-in. and less. (v) Roofing stone, 1.50 per ton.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Allentown, Penn.	1.00–1.50	.40– .60	.80–1.00	.50– .80	.50– .80	.60– .80	.80
Bethlehem, Penn.	1.25–1.75	.50– .70	1.00–1.25	.60– .80	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.25–1.75	.60	.90	.60– .90	.60– .90	.60– .90	....
Reading, Penn.	2.00	1.00	....	1.00	....	....	....
Swedeland, Penn.	1.50–2.50	.60–1.10	1.00–1.25	.90–1.25	.90–1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	....	1.30*	1.80*	1.45*	1.45*	1.45*	1.45*
Jackson, Ohio	....	.65*	1.80*	1.30*	1.30*	1.30*	1.30*
Toledo, Ohio	1.50	1.10	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	....	1.05*	1.80*	1.45*	1.45*	1.45*	1.45*
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*	....	1.15*	.90*	.90*	....

5c per ton discount on terms. †1¼ in. to ¼ in., 1.05; ⅝ in. to 10 mesh, 1.25*; ⅝ in. to 0 in., 90*; ¼ in. to 10 mesh, .80*.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$; 0% $MgCO_3$, 90% thru 100 mesh 4.50

Belfast, Me.—Analysis, $CaCO_3$, 90.4%; $MgCO_3$, trace; 90% thru 100 mesh, per ton 10.00

Branchton, Penn.—94.89% $CaCO_3$; 1.50% $MgCO_3$, 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh; per ton 5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh 1.50

Cartersville, Ga. 2.00

Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton 6.00

Gibsonburg, Ohio—Bulk, 2.25; in bags.. 3.70

Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh 3.50

Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk 2.50

Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton 2.00

Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh 5.00

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1% $MgCO_3$; 90% thru 10 mesh 1.50

Cartersville, Ga.—50% thru 50 mesh 1.50

Chico and Bridgeport, Texas—Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 90% thru 4 mesh 1.00

Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder 3.50

Cypress, Ill.—Analysis, 96% $CaCO_3$; 90% thru 100 mesh, 1.25; 50% thru 100 mesh, 1.25; 90% thru 50 mesh, 1.25; 50% thru 50 mesh, 1.15; 90% thru 4 mesh, 1.25, and 50% thru 4 mesh 1.15

Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton 1.10

Dubuque, Ia.—Analysis, 64.04% $CaCO_3$; 29.54% $MgCO_3$; 50% thru 50 mesh 1.00

Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 50 mesh; bulk, per ton 1.15–1.25

Gibsonburg, Ohio—90% thru 10 mesh.... 1.00–1.50

Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh, sacked 5.00

Jamesville, N. Y.—Analysis, 89% $CaCO_3$; 4% $MgCO_3$; 90% thru 100 mesh; in paper bags, 5.10; bulk 3.85

Lannon, Wis. — Analysis, 54% $CaCO_3$ 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00
Screenings (¼ in. to dust) 1.00

Marblehead, Ohio—90% thru 100 mesh.... 3.00
90% thru 50 mesh 2.00
90% thru 4 mesh 1.00

McCook and Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh .... .80

Olive Hill, Ky.—90% thru 4 mesh .... .50

Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags 3.50

Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh 1.15–1.70

Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh .... .75

West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk 3.50
100-lb. paper bags, 4.75; 100-lb., cloth 5.25

Waukesha, Wis.—90% thru 100 mesh, 3.65; 50% thru 100 mesh 2.10

*Less 25c cash 15 days.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton 6.00

Hillsville, Penn., sacks, 5.10; bulk 3.50

Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh (bags extra) 3.50

Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk 2.25–3.50

Waukesha ,Wis.—85% thru 200 mesh, bulk 4.00

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	....	....	11.40	....	....	17.50	....	20.65
Buffalo, N. Y.	....	....	....	12.00	....	....	....	....
Knickerbocker, Devault, Cedar Hollow and Rambo, Penn.*	....	9.50	9.50	9.50	8.00	9.50	8.50	....
Lime Ridge, Penn.	....	....	8.75	....	6.50	8.00[3]	5.00	....
CENTRAL:								
Afton, Mich.	....	....	....	....	....	10.75	7.50	....
Carey, Ohio	9.50	6.50	6.50	....	8.00	....	8.00	....
Cold Springs, Ohio	....	7.75	7.75	....	....	....	7.50	....
Gibsonburg, Ohio	10.50	....	7.75	....	7.00	9.00[9]	7.50	....
Huntington, Ind.	....	6.50	6.50	....	....	....	....	....
Little Rock, Ark.	....	14.40	....	14.40	....	....	11.90	....
Luckey, Ohio*	10.50	7.75	7.75	....	....	....	7.00	....
Marblehead, Ohio	....	6.50	6.50	....	....	....	7.00	....
Milltown, Ind.	....	9.00	8.25	9.50	7.50	....	7.00	....
Scioto, Ohio	10.50	6.50	6.50	7.50	7.00	....	6.00	15.00
Sheboygan, Wis.	....	10.50	10.50	....	....	....	9.50	9.50
Tiffin, Ohio	....	....	....	....	8.00	10.00	....	....
Wisconsin points	....	11.50	....	....	....	....	9.50	....
Woodville, Ohio	10.50	7.75	7.75	11.50[24]	7.00	9.00[9]	7.00	....
SOUTHERN:								
Cartersville, Ga.	....	9.00	....	....	....	13.50	....	15.00
Graystone, Ala.*	12.50	9.00	....	12.50	....	....	7.50	....
Keystone, Ala.	....	9.00	....	9.00	....	....	7.50	....
Knoxville, Tenn.	18.00	9.00	9.00	7.50	6.00	1.25[10]	6.00	....
Ocala, Fla.	....	11 00	....	....	....	....	....	....
Pine Hill, Ky.	....	9.00	8.00	9.00	....	....	6.00	12.50
WESTERN:								
Colton, Calif.	....	....	....	....	9.50[4]	....	....	....
Kirtland, N. M.	....	....	....	....	....	....	12.50	20.00
Los Angeles, Calif.	....	....	....	....	....	....	12.00	....
San Francisco, Calif.†	16.00	14.00	6.00–12.00	14.00–19.00	14.50[20]	....	11.00[19]	....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[20]	....	11.00[19]	....

[1]Also 6.00. [2]To 1.35. [3]In 100-lb. bags. [4]To 11.85 per ton, granular but not ground, ¾-in. screen down to 14 mesh. [9]In 80-lb. paper. [10]Per bbl. [17]Less credit for return of empties. [19]To 14.50. [20]Also 13.00. [24]Superfine, 92.25% thru 200 mesh. *Price to dealers. †Wood-burnt lime: finishing hydrate 20.00 per ton, pulverized lime 2.00 per iron drum. Oil-burnt pulverized lime, 13.00–14.50 per ton.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 100% thru 200 mesh, 94% thru 300 mesh, 7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton.

Granville, N. Y.—Red, green and black, $7.50 per ton.

Pen Argyl, Penn.—Blue-black, 6.50 per ton in bulk, plus 10c per bag.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—						
Buckingham oxford grey	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear	10.50–14.50	24.50	29.00	33.50	44.50	55.60
No. 1 ribbon	9.00–10.25	20.00	24.50	29.00	40.00	51.25
Gen. Bangor No. 2 ribbon	6.75– 7.25	....	....	....	....	....
Gen. Bangor mediums	9.50–11.25	....	....	....	....	....
Chapman Quarries, Penn.	7.75–11.25	13.00–15.00	19.00–22.00	23.00–28.00	27.00–30.00	32.00–35.00
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Monson, Maine	19.80	24.00	....	....	....	....
Pen Argyl, Penn.*						
Graduated slate (blue)	....	16.00	23.00	27.00	37.00	46.00
Graduated slate (grey)	....	18.00	25.00	29.00	39.00	48.00
Color-tone	11.50–12.50; Vari-tone, 12.00–13.00; Cathedral gray, 14.00–15.00					
No. 1 clear (smooth text)	7.25–10.50; No. 1 clear (rough text), 8:25–9.50					
Albion-Bangor medium	8.00–9.00; No. 2 clear, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.
*Unfading grey, 14.00–15.00; 10% disc. to roofer; 10%–8⅓% to wholesaler.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:	
Crude talc, per ton	5.00
Ground talc (20-50 mesh), bags	6.50
Ground talc (150-200 mesh), bags	9.00
Pencils and steel crayons, gross	1.50– 2.00
Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¼% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh	7.50– 8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.	
Clifton, Va.:	
Crude talc, per ton	4.00
Ground talc (150-200 mesh), in bags	12.00
Conowingo, Md.:	
Crude talc, bulk	4.00
Ground talc (150-200 mesh), in bags	14.00
Cubes, blanks, per lb.	.10
Emeryville, N. Y.:	
Ground Talc (200 mesh), bags	13.75
Ground talc (325 mesh), bags	14.75
Hailesboro, N. Y.:	
Ground talc (300-350 mesh) in 200-lb. bags	15.50–20.00
Henry, Va:.	
Crude (mine run)	3.50– 4.50
Ground talc (150-200 mesh), bags	6.25– 9.50
Joliet, Ill.:	
Ground talc (200 mesh) in bags:	
California white	30.00
Southern white	20.00
Illinois talc	10.00
Los Angeles, Calif.:	
Ground talc (150-200 mesh), in bags	14.00–25.00
Natural Bridge, N. Y.:	
Ground talc (325 mesh), bags	10.00–15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-72%	3.75– 4.25
Mt. Pleasant, Tenn.—B.P.L. 76-78%	6.75

Ground Rock

(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 65–70%	3.75– 4.30
Mt. Pleasant, Tenn. — Lime phosphate: B.P.L. 73.25%	11.80
Mt. Pleasant, Tenn.—B.P.L., 72%	5.00– 5.50

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Mulberry, Fla.—Gross ton, f.o.b. mines	
68/66% B.P.L.	3.15
70% minimum B.P.L.	3.75
72% minimum B.P.L.	4.25
75/74% B.P.L.	5.25
77/76% B.P.L.	6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	100.00–125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, Bristol and Cardigan, N. H.—Per ton:	
Punch mica, per ton	150.00–240.00
Mine scrap	22.50
Mine run	325.00
Clean shop scrap	25.00
Roofing mica	37.50
Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh	60.00

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Blue Rapids, Kan.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Centerville, Iowa	....	....	6.00	7.00	....	7.50	8.50	10.50a	....	....	....	....	....
East St. Louis, Ill.—Special	Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton, floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.												
Fort Dodge, Iowa	2.50	6.00	6.00	7.00	9.00	9.00	11.50	8.00	16.00	20.00	15.00	....	25.00
Grand Rapids, Mich. (h)	....	....	7.00	9.00	9.00d	9.50d	19.50	8.00d	26.00	20.00d	....	....	25.00
Los Angeles, Calif. (b)	....	7.00–9.00	7.00–9.00	7.50–9.00	8.00–10.00	....	8.00–10.00	....	30.00c	....	....	....	....
Medicine Lodge, Kan.	1.45	....	....	....	11.50d	....	11.50d	....	16.00d	11.50d	....	....	....
Oakfield, N. Y.	3.50	9.00	9.00	9.00	9.00	9.00	20.95	6.00	27.35	....	....	15.00	25.00
Port Clinton, Ohio	3.00	4.00	6.00	9.00	9.00	9.00	20.00	8.00	25.50	20.00i	....	15.00	25.00
Portland, Colo.	....	7.00	7.00	9.00	9.00	9.50	9.00	....	27.50	....	22.50	27.50	....
Providence, R. I. (x)	....	....	....	12.00–13.00e	....	....	....	....	....	....	....	....	....
Seattle, Wash. (z)	6.00	9.00	9.00	13.00	....	....	14.00	....	....	....	....	....	....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	....	....	....	....	20.00	25.00g	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) White molding. (b) Plasterboard, ¼x32x36-in., 14c-17c per sq. ft.; ⅜x32x36-in., 15c-18c per sq. ft. (c) To 40.00. (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (g) ⅜x48 by 3 to 4 ft. long. (h) Gypsum lath, per M sq. ft., 15.00. (i) To 26.00. (x) "Fabricaste" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plant, 7¼c-8¼c. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00. (z) Gypsum partition tile, 3-in., 9c per sq. ft.; 4-in., 11c per sq. ft.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, 12.00 per ton in bags, bulk, per ton		7.50
Crown Point, N. Y.—Mica Spar		¶9.00–‖12.00
Davenport, Iowa — White limestone, in bags, per ton	‖6.00	‖6.00
Harrisonburg, Va.	12.50–14.50	
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt.—Middlebury white		¶9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		c5.50
Phillipsburg, N. J.		16.00–18.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif. — Colored rock aggregate		6.00–18.00
Tuckahoe, N. Y.—Tuckahoe white	7.00	
Warren, N. H. (d)		¶8.00–‖8.50
Whitestone, Ga.		10.00

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50–15.00 per ton in 100-lb. bags.

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton 18.00

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140 mesh (bulk) 19.00

Keystone, S. D.—Color, white; analysis, K_2O, 13.25%; Na_2O, 1.92%; SiO_2, 63.50%; Fe_2O_3, .06%; Al_2O_3, 20.10%, pulverized 99% thru 200 mesh, in bags, 17.50; bulk 16.50
Crude, in bags, 9.50; bulk 8.50

Coatesville, Penn.—Color, white; analysis, K_2O, 12.30%; Na_2O, 2.86%; SiO_2, 66.05%; Fe_2O_3, .08%; Al_2O_3, 18.89%; crude, per ton 8.00

Erwin, Tenn.—White; analysis, K_2O, 10%; Na_2O, 2.75%; SiO_2, 68.25%; Fe_2O_3, .10%; Al_2O_3, 18.25%, pulverized 98% thru 200 mesh, in bags, 17.20; bulk 16.00
Crude, in bags, 8.50; bulk 7.50

Rumney and Cardigan, N. H. — Color, white; analysis, K_2O, 9-12%! Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk 7.00– 7.50

Rumney Depot, N. H.—Color, white; analysis, K_2O, 8-13%; Na_2O, 1-1½%; SiO_2, 62-68%; Al_2O_2, 17-18%, crude, bulk 7.00– 7.50

Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk 18.00
(Bags, 15c extra.)

Cement Drain Tile

Graettinger, Iowa. — Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in. 1.35; 36-in. 2.00

Grand Rapids, Mich.—Drain tile, per 1000 ft.

4-in.	36.00
5-in.	48.00
6-in.	66.00
8-in.	100.00
10-in.	150.00
12-in.	210.00

Longview, Wash.—Drain tile, per 100 ft.

3-in.	5.00
4-in.	6.00
6-in.	10.00
8-in.	15.00

Tacoma, Wash.—Drain tile, per 100 ft.

3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	12.00

Chicken Grits

Centerville, Iowa	9.25
Cypress, Ill.—(Agstone)	1.15
Belfast, Me.—(Agstone), per ton, in carloads	10.00
Chico. Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per ton	10.00
Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each	8.00
Cranberry Creek, N. Y.—Per ton, in carload lots, in bags, 9.00; bulk, 7.50. Less than carload lots, in bags	12.00
Davenport, Iowa — High calcium carbonate limestone, in bags L.C.L., per ton	6.00
El Paso, Texas—(Limestone) per 100-lb. sack	.75
Los Angeles, Calif.—Per ton, including sacks: Gypsum	7.50 –9.50
Middlebury, Vt.—Per ton (a)	10.00
Randville, Mich.—(Marble), bulk	6.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	¶17.50–‖9.00
Wisconsin Points—(Limestone), per ton	15.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton Wis.	10.50
Dayton, Ohio	12.50–13.50
Detroit, Mich. (d)	13.00–16.00*b
Farmington, Conn.	16.00
Grand Rapids, Mich.*	14.50
Iona, N. J.	12.00
Jackson, Mich.	13.00
Madison, Wis.	12.50a
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	9.00*
Mishawaka, Ind.	11.00
New Brighton, Minn.	8.00
Pontiac, Mich. (e)	15.50
Portage, Wis.	15.00
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50
Sebewaing, Mich.	12.50
South River, N. J.	11.00
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada	b13.00–15.00*
Winnipeg, Canada	15.00

Delivered on job. (a) Less 50c disc. per M 10th of month. (b) 5% disc., 10 days. (c) Delivered in city. (d) Also 14.00 and 15.50. (e) Truck delivery. (g) F.o.b. yard.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Appleton, Minn.	18.00–20.00
Chicago, Ill., district: 8x8x16. Per 1000	180.00
Chicago, Ill.:	
8x 8x16. Each	.21†
8x 8x16. Each	.18b
8x10x16. Each	.26†
8x10x16. Each	.23b
8x12x16. Each	.30†
8x12x16. Each	.27b
Columbus, Ohio	14.00b–16.00†
Forest Park, Ill	21.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Lexington, Ky.:	
8x8x16	a18.00*
8x8x16	c13.00*
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*

*Price per 100 at plant.
†Rock or panel face.
(a) Face. (b) Plain. (c) Common.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Cicero, Ill.—12x8 exposure, 15x9-in. size, per sq.	9.50–12.00
Detroit, Mich.—5x8x12, per M	67.50
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Lexington, Ky.—8x15, per sq.:	
Red	15.00
Green	18.00
Longview, Wash.:	
4x6x12-in., per 1000	55.00
4x8x12-in., per 1000	65.00

Cement Building Tile

Chicago District (Haydite):	
8x 4x16, per 1000	140.00
8x 8x16, per 1000	200.00
8x12x16, per 1000	300.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Lexington, Ky.:	
5x8x12, per 100	7.50
4x5x12, per 100	4.00
Longview, Wash. (Stone Tile):	
4x6x12, per 1000	57.50
4x8x12, per 1000	65.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	
Chicago District "Haydite"	14.00	
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	13.00a	
Forest Park, Ill.		37.00
Longview, Wash.	16.50	23.00– 40.00
Milwaukee, Wis.	14.00	32.00
Omaha, Neb.	17.00	30.00– 40.00
Philadelphia, Penn.	15.50	
Portland, Ore.	12.00	22.50– 55.00
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	25.00– 40.00

(a) Delivered on job; 10.00 f.o.b. plant.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Note—Bags extra and returnable for full credit.

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.		53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.		55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.		60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% disc.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Grand Rapids, Mich. (b)		.13½	.21	.31½	.40½	.64	1.00			1.80							
Culvert				.60	.70	1.00	1.20			1.80	2.10	2.25	3.35	4.00	5.60	6.90	7.85
Indianapolis, Ind. (a)				.75	.85	.90	1.15			1.60		2.50					
Newark, N. J. (d)					.85	.95	1.25	1.40	1.56	2.09	2.30	3.15	4.05	5.15	6.35	7.65	
Norfolk, Neb. (b)				.90	1.00	1.13	1.42			2.11		2.75	3.56		6.14		7.78
Tiskilwa, Ill. (rein.)				.75	.85	.95	1.20	1.60		2.00		2.75	3.40		6.50		10.00
Tacoma, Wash.	.15	.17	.22½	.30	.40	.55	.70										
Wahoo, Neb. (c)					.85½		1.14			1.81		2.47	3.42	4.13	5.63	6.49	7.31

(a) 24-in. lengths. (b) Sewer, 21-in., 1.40. †21-in. diameter. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced.

Annual Accident Study Encouraging

Cement Mills Continue to Reduce Personal Injury to Workmen

By J. B. John

President of the Medusa Portland Cement Co. and Chairman of the Committee on Accident Prevention of the Portland Cement Association

IT IS CUSTOMARY for us in the cement industry to make a careful analysis annually of mill and quarry accidents in which workmen are injured or killed. Fortunately, the cement manufacturers who are members of the Portland Cement Association have reported their lost-time, permanent disability and fatal accidents to the association for many years, so that there is available a great deal of detailed comparative data by which recent records may be judged.

J. B. John

"WHEN a small boy of six years my father was cruelly taken from me by an accident. I went to work in a Pennsylvania coal mine when I was eleven. A great deal of kindness was shown me by others, but it could never compensate to any extent for the loss of my father. It was very real and very severe, as those know who have gone through this tragedy, and it has left its lasting impression on me. If any benefits may be salvaged from experiences of this kind, they will come through our efforts to end such accidents, and in that way prevent sorrow and blight on the lives of others."

In having these valuable records we are fortunate indeed. I know of no other industry in which practically all of the operating units report their accident experience to a central bureau for analysis; consequently no other, so far as I am aware, has the advantage of having the detailed experience of all operators pooled or consolidated as an aid in directing future accident prevention work and selecting specific hazards to be attacked and specific corrective methods to be employed.

There are two yardsticks commonly used to measure accident records: The frequency with which accidents occur and the severity of the consequences of the accidents. Of the two, accident frequency is the far better indicator and in the study of cement-plant accidents far more attention is paid to frequency than to severity. We are much more interested in how often the mental mistake or break which causes an accident occurs than in the extent of the resulting injury. It is the frequency of accidents that we are attacking rather than the severity of the injury which follows.

How Accident Frequency Has Dropped

For the past ten years there have been very definite signs of improvement with respect to the accident situation in our industry. Improvement had taken place to such an extent that L. T. Sunderland, when president of the Portland Cement Association in 1922, said in an address:

"I believe no industry has done more in recent years for the safety and comfort of its workmen than ours, and the activity of this association in 'accident prevention' has been a stimulation to endeavor in many mills where formerly serious and too frequently fatal accidents were common."

In view of Mr. Sunderland's statement, which was made on the strength of the encouraging accident reductions appearing at that time, the very significant progress during recent years is all the more outstanding. In 1923, the year following Mr. Sunderland's statement, 99 mills reporting their accidents to the Portland Cement Association suffered a total of 3242 lost-time and fatal accidents, an average of about 32 accidents per plant and on the basis of an estimated production of about 120,000,000 bbl. produced in these mills there were about 27 accidents per million barrels of cement produced. There were about 4.2 accidents per 100,000 han-hours worked. The records also show about 75 days per 100,000 man-hours worked were lost as a result of accidents. The total number of days lost through accident causes that year were 58,523, equal to almost 200 years, figuring about 300 working days to the year.

By way of contrast, the comparable figures for 1929 should make us both happy and optimistic. The 138 plants providing the association with complete accident information suffered a total of only 723 lost-time and fatal accidents, a reduction of 78%; within the intervening period almost four out of every five accidents serious enough to cause loss of time have been eliminated, while the number of reporting mills increased 38%. Last year there were only 5.25 accidents per reporting plant and only about 4.5 accidents per million barrels of cement produced.

In 1929 there were about 0.95 accidents per 100,000 man-hours worked and 23.4 days lost per 100,000 man-hours worked.

The reduction of accidents shown by the annual totals is unusual. The 1925 total is 18% under that of 1924; the 1926 total is 15% under that of 1925, and suc-

TABLE SHOWING THE GROSS MONTHLY ACCIDENT TOTALS SINCE JANUARY, 1924

	1924	1925	1926	1927	1928	1929	1930
January	280	249	197	133	63	55	50
February	284	232	183	108	76	48	43
March	280	252	198	140	91	40	62
April	285	236	171	152	101	64	....
May	271	234	174	110	82	61	....
June	271	92	204	59	42	42	....
July	317	231	199	105	77	73	....
August	285	227	198	124	80	94	....
September	237	215	181	123	88	62	....
October	240	259	187	131	78	75	....
November	177	200	164	94	87	58	....
December	207	182	165	88	48	53	....
	3134	2609	2221	1379	913	725	....

SUMMARY OF ANNUAL STATISTICS OF ACCIDENTS

Year	Number of plants reporting	Man-hours worked	Number of lost-time accidents	Number of days lost	Days lost per 100,000 man-hours	Number of permanent disabilities	No. of fatalities
1925	120	97,414,794	2548	48,565	49.4	78	61
1926	124	97,380,785	2172	44,181	45.3	67	45
1927	136	93,871,081	1339	33,172	35.3	67	31
1928	136	85,796,645	877	27,989	32.6	74	33
1929	138	75,739,429	686	17,751	23.4	52	37

cessive annual reductions amount to 38%, 34% and 15% of the previous year's total, respectively. It is noticed that whereas 1928 accidents fell 34% below those in 1927, 1929 accidents amounted to 15% of the 1928 mishaps, showing a considerably smaller rate of improvement than during the preceding year. This, we believe, is a significant sign and should contain a warning that more earnest efforts will be required in the future.

Improvement Is Quite General

It is interesting to note that where there has been a reduction of 72% during the last five years in the accident totals for the entire group reporting, this improvement has not been confined to certain sections at the expense of others. For example, 18 cement plants in the Lehigh Valley which have operated and reported each year during the past five-year period show a decrease from 312 lost-time and fatal accidents in 1925 to 47 accidents of similar classification in 1929, a reduction of 85%.

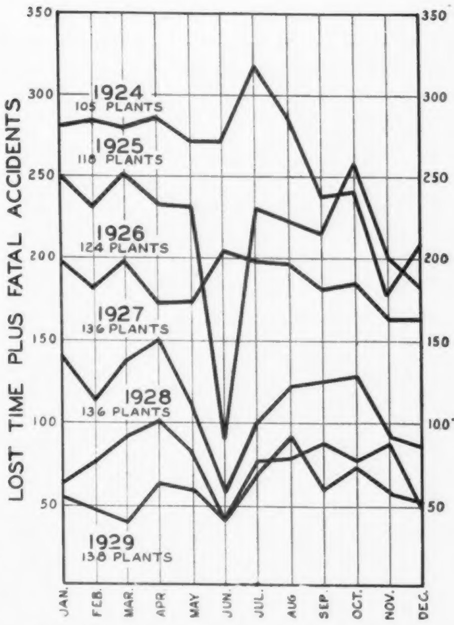
In Ohio the group of five mills for which comparable figures are available for the last five years show a reduction from 38 accidents in 1925 to 10 accidents in 1929, a decrease of 68%. Similar figures for eight mills in Michigan show 138 accidents in 1925 and 42 accidents in 1929, a reduction of 70%. That equally good work has been accomplished in the Southwest is apparent from the fact that accidents in five mills reporting every year for the last five years dropped from 76 in 1925 to 9 in 1929, equivalent to 88%.

Six mills in Texas suffered 117 accidents five years ago and 31 last year, diminishing the accident volume by 73%; 10 mills in the Kansas - western Missouri - Oklahoma-Nebraska group reduced mishaps from 213 in 1925 to 57 in 1929, 73%, and 12 mills operating on the Pacific Coast cut their accidents from 232 to 102, amounting to 60%, during the same period. The following table gives these figures in somewhat more detail:

RECORDS OF TYPICAL LOCAL GROUPS

	Number of plants	Combined lost-time and fatal accidents 1925	1926	1927	1928	1929
Lehigh Valley	18	312	232	163	79	47
Ohio	5	38	44	39	13	10
Michigan	8	138	77	101	55	42
Southeastern	5	76	58	36	7	9
Texas	6	117	71	29	26	31
Southwestern	10	213	135	61	57	57
Pacific Coast	12	232	300	215	116	102

Not only has the number of plants securing perfect safety records for an entire year increased from one (0.95% of the reporting plants) in 1924, to 29 (21% of the reporting plants) in 1929, but the records at the foot of the accident list are getting much better. The spread between the best and the poorest records continues to be disappointing, however. In the 1929 record 20% of the mills had no accidents.



Monthly accidents all plants reporting

The best 25% (37 mills) had a total of only 8 accidents. On the other hand, the 25% (37 mills) at the foot of the list suffered approximately 500 accidents. No possible difference in operating conditions can justify the latter group of mills in having over 60 times as many accidents as the former group.

Accident Prevention Helps Morale

We attribute a large part of the improvement in accident records to the conspicuous increase in interest in safety on the part of management, supervisory organizations, and workmen. The management is making it clear that it does not want men to take risks, that it will not hire careless men, and that it will bestow no credit upon any man who takes a chance and gets hurt. The supervisory organizations in the mills have improved remarkably in their methods of interesting and educating the men, and the latter find it easier to do their part with all of the organization above them intelligently carrying on.

As a result of the greater interest in safety and the greater pride in plant safety records, men are not only more intelligent in avoiding accidents than in the past, but when a minor accident does occur they are prompt to apply for first aid or other attention, and it is growing more and more unusual for them to lay off unless the surgeon specifically recommends this procedure.

Pride in their work, in their plant record and in their personal standing has developed to a point where few men will stoop to allege an accident as an excuse for one or a few days off. There is less desire and less opportunity for malingering with an active safety committee investigating every case which threatens the mill record. While the careless man who gets hurt wantonly in a cement mill may rest assured that his fellow workers will go the limit to minimize his disability and loss of time, he will soon learn that he is no hero with his superintendent, foreman, fellow workers, or the community.

So we are not only avoiding accidents. We are building character, spreading contentment, making for regularity of habits and interest in work, helping to prevent men from becoming loafers, and increasing the worker's income. These factors are reflected in a study of what we have listed as accident severity figures.

COMPARISON OF THE RELATIVE SEVERITY OF DISABILITY FOR 1925 AND 1929

Length of disability	Number of accidents in 1925	Per cent of year's total	Number of accidents in 1929	Per cent of year's total
One day	233	8.95	33	4.56
Two days	267	10.26	40	5.53
Three days	187	7.20	43	5.94
Four days	155	5.96	47	6.50
Five to ten days	626	24.05	118	16.32
Ten to thirty days	648	24.90	214	29.59
Thirty to sixty days	253	9.73	110	15.21
Sixty to ninety days	80	3.07	38	5.25
Over ninety days	89	3.42	39	5.39
Fatal	58	2.22	37	5.11
Total disability	3	....	4	....
Unknown	1	....	0	....
	2602		723	

For example, five years ago, 233 accident reports or 8.95% of the total number accumulated that year covered cases which involved a loss of only one day's time. Last year there were but 33 cases involving loss of one day's time, and these amounted to 4.56% of all the lost-time and fatal accidents. From these figures it is clear that this class of absences has decreased twice as rapidly as have accidents as a whole, and that one-day accident reports are only 14% as numerous as five years ago.

These same facts apply to the more serious accidents, but to a diminishing degree as the gravity of the disability increases. Accidents involving the loss of one to ten days' time have decreased from 56.4% in 1925 to 43.2% of the total in 1929. The one- to ten-day accidents numbered 1468 five years ago and only 281 last year. The latter number is but 19% of the former.

Fatal Accidents

The experience with fatal accidents in the mills offers one of the most interesting aspects of the studies made by the Portland Cement Association. Over two years ago fatal accidents showed an inclination to resist the general downward trend and soon exhibited evidence of increases. Several studies were at once undertaken by a subcommittee appointed for the purpose. Fatalities continued on the increase until at the end of the eighth month last year this class of accident was 58% more numerous than during the corresponding period a year before. August, the last month of the eight, produced nine fatal accidents—more than any other month on record.

About the time this peak was reached our committee on accident prevention released its reports on the situation and took measures to concentrate the interest of the entire operating organization in a determined drive to reduce fatalities. The effect was almost unbelievable. The reports seemed to picture the situation so vividly that it became intolerable and the effects were felt in almost immediate improvement.

Whereas August, 1929, was charged with nine fatal accidents, September, 1929, had but one, and the total number of fatals from August 31 to December 31 was only six, representing by far the lowest rate for fatalities which our industry ever experienced. Instead of being 58% above 1928, as indicated at the end of the first eight months, 1929 closed with our fatals only 11% above those of the preceding year, and we believe that further progress may be expected.

RELATION OF FATAL TO LOST-TIME ACCIDENT FREQUENCY

	Number of lost-time accidents per fatal
1925	41.8
1926	48.2
1927	45.0
1928	26.6
1929	18.6
January, 1929	12.7
February	23.0
March	19.0
April	20.7
May	19.3
June	9.5
July	13.6
August	9.4
September	61.0
October	24.0
November	57.0
December	52.0

I do not want to detract at all from the excellent results achieved by the cement-mill organization in so greatly reducing injury to their workmen, for they are magnificent; but no one must permit himself to feel that he has done his best, or even made the effort, which a clear conscience demands, so long as our record is marred by these fatalities. I know from my own experience, and that of many around me, something of the tremendous price which must be paid for every life so sacrificed.

When a small boy of six years my father was cruelly taken from me by an accident. I went to work in a Pennsylvania coal mine when I was eleven. A great deal of kindness was shown me by others, but it could never compensate to any extent for the loss of my father. It was very real and very severe, as those know who have gone through this tragedy, and it has left its lasting impression on me. If any benefits may be salvaged from experiences of this kind, they will come through our efforts to end such accidents and in that way prevent sorrow and blight on the lives of others.

Accidents still take a tremendous toll from our industry in money actually paid out and in loss of efficiency. But the loss to the injured and their families is even greater. They are the real victims. It is this latter factor particularly which should keep us diligently at work for accident prevention.

A Government Compliment

Ethelbert Stewart, U. S. Commissioner of Labor Statistics, recently said, in discussing the use of statistics to fight accidents, by the Portland Cement Association:

"Statistics cannot reduce accidents, but they can tell you where the accidents occur, and without knowing where the accidents occur and how they occur, all of your accident prevention work is simply slap-stick jabbing around in the dark. It is worth more to know where to apply your preventive methods and what methods to apply at a particular point than the total cost of your statistical department.

"Within certain carefully guarded limits you are printing more detail of accidents and accident prevention than any other association, not only in the United States but in the world. And you are doing things by reason of the statistics along the lines covered in these reports."

The Psychology of the Safety Campaign*

By V. K. Fischer

Combustion Engineer, Trinity Portland Cement Co., Dallas, Tex.

ONE of the latest industrial specialists to appear on the economic horizon is the safety engineer. He relies upon the mechanical engineer to provide the safeguards against injury of men by machines, but what agency can he enlist to prevent or at least minimize the tendency of men to hurt themselves? I believe there is at hand the needed help in the form of applied psychology. Let us examine the factors involved and try to determine their relative importance.

Psychology, as one of the new sciences, has hardly begun to comprehend, much less control human conduct and desire. It concerns itself, however, with the co-ordinated activities of the mind and body, and is thus patently an item to be taken into account in the present discussion.

We accept as fundamental the premise that civilization is an intellectual achievement. Man's instincts and emotions have played at best a secondary part in his attainment to the present high level of his development. A very significant fact presents itself here as we observe that nearly all of our activities proceed unconsciously; a great part of the work of the mind is automatic and goes on without our deliberate control. The same is also true of bodily habits. Perhaps here is the key to the causes of accident proneness. We are repeatedly told that over 15% of industrial accidents can be prevented by mechanical means, which leaves 85% of such accidents chargeable to faulty co-ordination of the minds and bodies of workers.

There is probably no business which is maintained for purely altruistic ends; industrialists are not striving to achieve artistic personalities by the introduction of unwonted sentiment in their commercial operations. Nevertheless accident prevention work is being accredited more and more as an administrative function. It may be well to digress for a moment and, at the risk of repeating known facts, cite the report of the American Engineering Council, published in 1928 under the title of "Safety and Production." The information upon which the council based its findings and conclusions embraced about 14,000 plants and nearly 2,500,000 employes. A comparison of the figures for 1922 and 1925 showed that productivity had increased 14.4%, accident frequency had decreased 10.4% and accident severity had increased 2.5%.

With reference to the accident severity increase just noted I might call attention to the statistics compiled by a large industrial

*Paper presented before the Cement Section, Southwestern Safety Congress, Dallas, Tex., April 25, 1930.

insurance company showing that a small proportion of workmen in a factory usually have most of the accidents at a given plant. In the same connection we may quote the familiar statement of the Personnel Research Federation to the effect that most automobile accidents are caused by people who have caused them before. This leads to an inquiry into the matter of the accident-prone individual. Such a study was undertaken by the Cleveland Railway Co. early in 1929. They made case studies of all trainmen with high accident records at one of the Cleveland operating stations. The Metropolitan Life Insurance Co. assisted in the survey, the purpose of which was to determine causes and remedial measures. Analysis of the accident record at the selected station apparently confirmed statements of psychologists that accidents do not distribute themselves by chance, but that they happen frequently to some men and infrequently to others as a logical result of a combination of circumstances. I want to emphasize this matter in detail a bit later, but now wish to remark that within six months 75% of the accident-prone men in the group under observation were freed from their former tendencies to the extent of 42.7% reduction in their average accident rating.

The case of the Cleveland trainmen incidentally confirms the belief that unsafe operation is usually inefficient operation, as it was found that the men who produce unsatisfactory accident records also tend to consume an excessive amount of power. The extensive and intensive research conducted by the American Engineering Council, covering the experience of a large number of companies, likewise shows that maximum productivity is ordinarily secured only when accident occurrence is tending downward. Incidentally the matter of efficiency, apart from the element of safety, can be materially affected by the methods of supervision in vogue. This is strikingly illustrated in examining the results of the studies of employe effectiveness, started in 1927 at the Hawthorne plant of the Western Electric Co. (This reference will be seen to be in order in connection with our general topic of applied psychology in industry.)

Regarding distinct psychological effects upon the employed, we might note first that official sanction of the safety campaign has a most helpful influence upon the morale of the workingmen, especially if they be invited to participate in the discussion of the proposed improvements. All men like to feel that they are necessary parts of their respective organizations and are happy to help maintain the traditions of their plants. Group loyalty can be engendered by the safety director if he makes it clear that such loyalty implies a willingness to obey the prescribed safety code which may be operative at the time. The men are encouraged in the art of creative thinking, which is essentially the expression of progressive education. I am well aware that the level of the entire personnel cannot be raised to the same high elevation, but those individuals who give evidence of some ability can be developed to the advantage of all concerned. The immediate objective is an extension of the leadership function.

Let us visualize the safety engineer in action. He may be conducting periodical safety meetings, selecting men by lot to assist him with short talks on timely topics. Here we have the essence of social harmonization, men sharing the motions and the emotions of mutual interests and common tasks. A natural stage for psychological reactions. New lines of reasoning are presented, the seeds of new habits of thought, feelings and actions are sown. The average individual responds sooner or later with a conscious effort to conform. The type which reacts last may be in the class that requires a more vigorous stimulus, if not a distinctly personal approach. The confidence of a man in this class may be harder to establish, but it is possible to encourage such a person to talk of general topics in his background. Thus may be brought to light detrimental influences which the safety director might be able to eliminate. This is the sort of work done by the Cleveland Railway Company, mentioned above. Their results suggest the advisability of making a graded system along those lines, on the same principle but properly modified for corresponding types in various industries.

Our chief concern is of course to see that all employes are adjusted to their jobs in order to forestall accidents. This is a good business, just as it is good business to advertise salable goods when the market is quiet. Actually, we are promoting the cultivation of automatic, co-ordinated functioning of body and mind which will continue to operate even under abnormal conditions. This may represent the ideal condition, but it is attainable, nevertheless. An illustration of such disciplined co-ordination is to be seen in the advance of troops under fire, their ranks being decimated by enemy shells, yet the survivors move onward under the compelling influence of discipline. Industrial training of the mental and bodily habits can insure that degree of performance necessary to lower the accident rate to the irreducible minimum, if the training methods are logically calculated, and gradually applied. Cement men know that excessive pressure rapidly applied will crush a concrete column, but a gradually increased load can be built up to a total pressure many times that which was disastrous in the first case, yet easily understood in the second.

Some one has said that "An accident compensated is an apology; an accident prevented is a benediction." Let that be our slogan; let that represent our judgment as to the value of activities. Let our accident prevention agencies instill that ideal in the minds of workingmen everywhere, in order that the highest type of safe co-operation may become an accomplished fact.

Notable Achievements Recognized in National Safety Competition

OUTSTANDING safety accomplishments of a number of large mines and quarries have just been recognized in the awarding of the "Sentinels of Safety" trophy to the winners of the National Safety Competition held during 1929 under the auspices of the United States Bureau of Mines, Department of Commerce. Approximately 300 coal and metal mines, nonmetallic mining operations and quarries located in 33 states participated in the contest. Two large iron mines in Michigan, a Kansas zinc and lead mine, an Oklahoma zinc and lead mine, a salt mine in New York, an Ohio limestone mine and 46 quarries and open-cut mines in Michigan, Oklahoma, Ohio, Missouri, Pennsylvania, Illinois, Virginia, Iowa, California, Indiana, New York, Texas, New Jersey, Maryland, Kansas and Alabama were operated throughout the year without a single accident involving loss of working time by an employe. The total amount of exposure to hazard was more than 106,000,000 man-hours.

The notable safety records achieved have been made the occasion for the addressing of congratulatory letters to the winners of the competition by Secretary Lamont of the Department of Commerce, in which he points out that the production of the nation's minerals without loss of life and without injury to the miner or quarryman should be the natural objective of every producing company. Commendatory letters are being sent by Director Scott Turner of the Bureau of Mines to the various mines and quarries awarded honorable mention in the contest.

The purpose of the National Safety Competition is, through the medium of friendly rivalry, to assist in the reduction of the number of personal injuries in the mineral industries of the United States. The 1929 contest was the fifth held. Competing companies were grouped into five classes, namely, anthracite mines, bituminous coal mines, metal mines, nonmetallic mineral mines, and quarry and open-cut mines. The winner in each group was the mine or quarry whose record showed the smallest loss of time from accidents in proportion to the total amount of time worked by all employes. The competition for the trophy was restricted to mines employing at least 50 men underground and to quarries and open-cut mines employing at least 25 men in the pit. The bronze trophy, "Sentinels of Safety," the work of a well-known artist, is awarded to the winning company in every group by the *Explosives Engineer*.

The best record among mines producing

nonmetallic minerals other than coal was made by the Retsof rock salt mine of the Retsof Mining Co., Retsof, N. Y. In this mine 257,927 man-hours were worked in 1929 with no lost-time accidents.

In the nonmetallic mine group honorable mention was given the Ironton limestone mine of the Alpha Portland Cement Co., Ironton, Ohio; the North Holston gypsum mine of the Beaver Products Co. of Virginia, Inc., North Holston, Va.; the Lower gypsum mine of the United States Gypsum Co. of Gypsum, Ohio, and the Akron gypsum mine of the Certain-teed Products Corp., Akron, N. Y.

Among the quarries and open-cut mines, the operation establishing the best record was the limestone quarry of the Michigan Limestone and Chemical Co. at Rogers City, Mich., which worked 753,156 man-hours without a lost-time accident.

In this group honorable mention was given the following named contestants, none of which sustained a lost-time accident during the year 1929: the Wakefield open-cut iron ore mines of the Wakefield Iron Co., Wakefield, Mich.; the shale and limestone quarry of the Oklahoma Portland Cement Co., Lawrence, Okla.; the Columbia quarry of the Pittsburgh Plate Glass Co., Zanesville, Ohio; the Marquette Cement Manufacturing Co. limestone quarry, Cape Girardeau, Mo.; Quakertown trap rock quarry of the General Crushed Stone Co., Rock Hill, Penn.; the Marquette Cement Manufacturing Co. limestone quarry, La Salle, Ill.; the cement rock quarry of the Lehigh Portland Cement Co., Ormrod, Penn.; the trap rock quarry of the John T. Dyer Quarry Co., Birdsboro, Penn.; the limestone and shale quarry of the Lehigh Portland Cement Co., Fordwick, Va.; the limestone and clay quarry of the Lehigh Portland Cement Co., Mason City, Iowa; the limestone quarry of the Calaveras Cement Co., San Andreas, Calif.; the Dewey Portland Cement Co. limestone quarry, Dewey, Okla.; the cement rock quarry of the Louisville Cement Co., Speed, Ind.; the limestone quarry of the Alpha Portland Cement Co., La Salle, Ill.; the Oak Corners limestone quarry of the General Crushed Stone Co., Geneva, N. Y.; the Trinity limestone quarry of the Trinity Portland Cement Co., Dallas, Tex.; the limestone quarry of the Lone Star Cement Co. New York, Inc., Hudson, N. Y.; the limestone quarry of the Vulcanite Portland Cement Co., Phillipsburg, N. J.; the limestone quarry of the North American Cement Corp., Security, Md.; the Lehigh Plant B limestone quarry of the Lehigh Portland Cement Co., Mitchell, Ind.; the limestone quarry of the Cowell Portland Cement Co., Cowell, Calif.; the limestone quarry of the Alpha Portland Cement Co., Cementon, N. Y.; the limestone and shale qarry of the Lone Star Cement Co. (Kansas), Bonner Springs, Kan.; the Sandts Eddy cement rock quarry of the Lehigh Portland Cement Co., Easton, Penn.; the limestone quarry of the Lehigh Cement Co., Oglesby, Ill.; the limestone quarry of the Hercules Cement Corp., Stockertown, Penn.; the shale and limestone quarry of the Lehigh Portland Cen.ent Co., Iola, Kan.; the cement rock quarry of the Lone Star Cement Co. Pennsylvania, Nazareth, Penn.; the limestone quarry of the France Stone Co., North Baltimore, Ohio; the limestone quarry of the Lehigh Portland Cement Co., Tarrant, Ala.; the marl quarry of the Lone Star Cement Co., Virginia, Chuckatuck, Va.; the limestone quarry of the Lehigh Portland Cement Co., Union Bridge, Md.; the Richmond iron ore open-cut mine of the Richmond Iron Co., Palmer, Mich.; the Medusa limestone quarry of the Medusa Portland Cement Co., Toledo, Ohio; the clay-limestone quarry of the Medusa Portland Cement Co., York, Penn; the plant No. 4 limestone and cement rock quarry of the Pennsylvania-Dixie Cement Corp., Nazareth, Penn.; the limestone quarry of the Lone Star Cement Co. Alabama, Birmingham, Ala.; the limestone quarry of the Alpha Portland Cement Co., Alpha, Mo.; the limestone quarry of the North American Cement Corp., Catskill, N. Y.; the cement rock quarry "A" of the Edison Portland Cement Co., Stewartsville, N. J.; the Plant 7 limestone and shale quarry of the Pennsylvania-Dixie Portland Cement Corp., Portland Point, N. Y.; the limestone quarry of the Lehigh Portland Cement Co., New Castle, Penn.; the limestone quarry of the Alpha Portland Cement Co., Bellevue, Mich.; the Reliance cement rock quarry of the Giant Portland Cement Co., Egypt, Penn., and the limestone quarry of the Consolidated Cement Corp., Mildred, Kan.

Cement Mills Fix Dates for Safety Trophy Dedications

DATES have already been set for 11 of of the 28 celebrations to take place during the next few months when the Portland Cement Association trophies will be dedicated at mills which operated throughout 1929 without a lost-time accident.

The first of these occasions, so far as announced, will be held on Tuesday, June 3, at the Birmingham (Ala.) mill of the Lehigh Portland Cement Co. Col. E. M. Young, president of the Lehigh organization, and a group of the company's leading officials as well as a distinguished group of local officials and citizens will be present. On Thursday, June 5, an unusual ceremony in honor of the completion of three calendar years' operation without an accident will be held at the Iola (Kan.) mill of the Lehigh company, with Colonel Young and leading company officials also present.

President John L. Senior of the Consolidated Cement Corp. has set Sunday afternoon, June 8, for a community party at Mildred, Kan., celebrating two calendar years of safe operation at the company's plant located there. James E. Curtis, general superintendent; F. E. Dodge, chief engineer, and other leading officials of the corporation will assist President Senior in handling the affair.

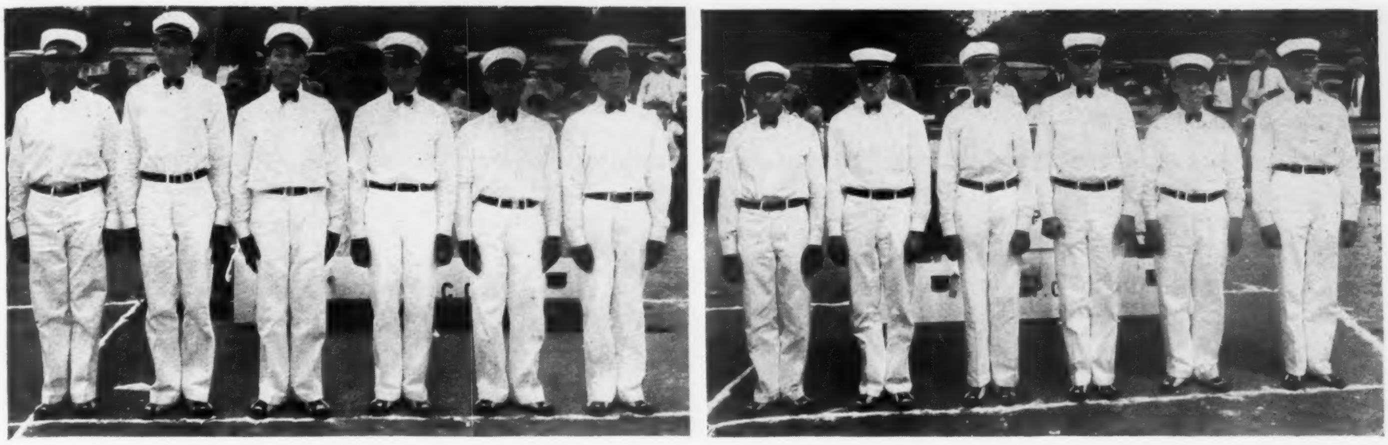
On Wednesday, June 11, trophy dedication ceremonies will be held at the plant of the Great Lakes Portland Cement Corp., Buffalo, N. Y. Adam L. Beck, president of the corporation, and J. B. Zook, plant safety engineer, are arranging for an outstanding affair. Ormrod (Penn.) mills Nos. 2 and 3 of the Lehigh Portland Cement Co. will hold their celebrations on June 18 and 19, with J. B. John, chairman of the Portland Cement Association committee on accident prevention, as guest of honor. Mr. John made his start in the cement industry at Ormrod 32 years ago.

Southern subsidiary mills of the International Cement Corp. will hold their trophy dedication ceremonies during the week of June 16. On Tuesday, June 17, the association safety monument will be unveiled at the Birmingham plant of the Lone Star Cement Co., Alabama, and on the following day a similar ceremony will take place at the Spocari plant of the same company. J. W. Johnston, vice-president and manager of the company, and A. D. Stancliffe, general superintendent of the southern mills of the International system, are making arrangements which include a barbecue and other popular features.

On Thursday, June 19, a bronze tablet will be unveiled at the St. Stephens (Ala.) quarry which serves the New Orleans plant of the Lone Star Cement Co., Louisiana. This quarry participated in the perfect safety record of the New Orleans plant last year, but as the Portland Cement Association trophy will be erected at the mill, Lone Star officials decided to erect a suitable tablet at this distant quarry in recognition of the accomplishment of the men. A barbecue and general jollification is being planned also at St. Stephens.

The unveiling and dedication of the trophy at the New Orleans mill will take place on Friday, June 20. It is expected that following the formal ceremonies at the plant a big picnic party will be held, if possible at one of the beaches. Vice-President Scott Thompson and General Superintendent Stancliffe are making the arrangements.

On July 4 will occur two of the biggest cement mill celebrations of the year. William H. George, secretary and general manager of the Cowell Portland Cement Co., has again chosen the national holiday for the annual safety rejoicing at Cowell, Calif., and Charles E. Ulrickson, vice-president of the Trinity Portland Cement Co., has selected it likewise for a stirring event which is to mark the dedication of the safety trophy at the Houston (Tex.) mill of the Trinity company.



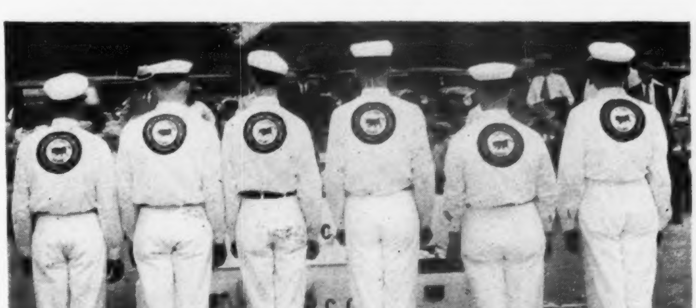
One of the seven Mexican teams, at left, competing in the El Paso first-aid contest and the American team No. 1

El Paso Wins Honors

THE EL PASO (Tex.) plant of the Southwestern Portland Cement Co. recently participated in a spirited contest of local first-aid teams, the first of its kind to be held in El Paso. The contest, which was held on April 12, was organized as a result of interest in safety work accumulated in the vicinity by the U. S. Bureau of Mines' first-aid car and was managed by first-aid specialists of the bureau.

H. E. Nichols, superintendent of the El Paso mill, has been quite active in safety work in the community as well as in the cement plant, and he and his assistants welcomed the opportunity presented by the contest to attract the attention of the workmen. Consequently two means were entered by the cement mill—one consisting of Americans and the other of Mexicans. A total of 13 teams entered from the various industries and competition was very keen. Notwithstanding the fact that the cement plant teams as well as some of the others were handicapped by shortness of time in which to prepare, the difference in final score between the first and the 13th teams was only 52 points out of 1000. The first team scored 982 and the 13th scored 930. The entrants included six American teams and seven Mexican teams.

The Southwestern Portland Cement Co.'s American team finished third and the Mexican team finished 10th, which was the third best score among the Mexican teams. Considering the newness of this work to the cement-mill men, the results were highly gratifying and as the contest is to be made an annual event, plans are already under way by the cement makers to carry off the top awards in 1931. The cement company's American team received the silver cup offer as a third prize and it is now being displayed proudly at the mill office.



Rear view of the attractive uniforms worn by the teams at El Paso contest first-aid

Four Kentucky Quarry Men Killed in Blasting Accident

FOUR men were killed and five injured in an explosion May 3 at a quarry of the Kentucky Consolidated Stone Co., Upton, Ky. The accident was caused by a premature explosion of Loxite, a liquid oxygen explosive.

One of the men killed was the head of the firm which manufactures the explosive. His assistant was injured.

The dead are:

Reginald Lanier, 28 years old, of Madisonville, superintendent of the Oxygen Products Corp., Ilsley.

Charles Hornbeck, 42.

Robert Hornbeck, 23.

George McDougal, 74, Negro.

All the injured are expected to live, according to Dr. C. T. Riggs and Dr. G. R. Turner, who attended them.

The injured are:

B. J. Stubbins, 55, quarry foreman.

T. A. Petty, 35, Dawson Springs, assistant to Mr. Lanier.

Jess Gunthaman, 55.

Earl Gunthaman, son of Jess Gunthaman.

Otto Avery, 40, fireman of the quarry steam shovel.

Jess Gunthaman, the most seriously injured of the men, was taken to a Louisville hospital.

Quarry workmen said the explosion occurred about 2:30 o'clock in the afternoon, when 19 well-drill holes had been filled with the explosive. Mr. Lanier was superintending the blasting preparations. According to workmen, one of the explosives failed to go into the hole, and Mr. Lanier prodded it with a "harpoon." The explosion followed immedately.

V. C. Morgan, secretary-treasurer of the Kentucky Consolidated Stone Co., Louisville, and C. W. Lovell, chief engineer, investigated the explosion.

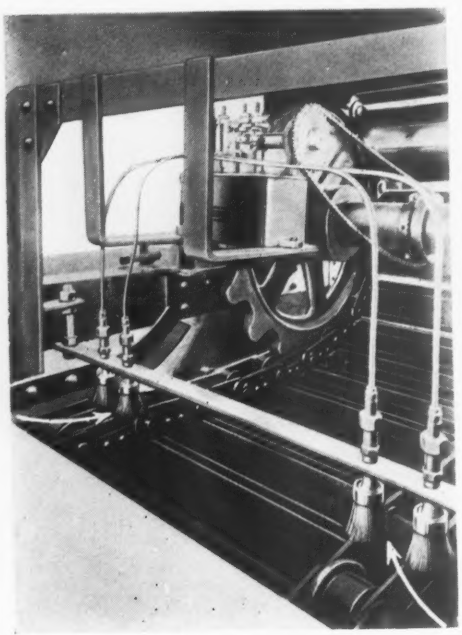
The above information, taken from local newspaper reports is substantially correct. Other information, obtained first hand by an expert who made a personal investigation, is as follows: The well drill holes were in three parallel rows, the back row had 11 holes, the second 8 holes, and the one nearest the quarry face 5 holes. The rows of holes were loaded simultaneously but the two rear rows had been fully loaded and were connected up with cordeau fuse for firing. Two holes in the front row had been fully loaded with cordeau attached, and Mr. Lanier was personally placing the third cartridge in the third, or middle hole, when it stuck. Two cartridges with cordeau fuse had already been placed in this hole. The stuck cartridge was about 6 ft. from the top of the hole, and Mr. Lanier was attempting to recover it, or force it down apparently with a steel-pointed "harpoon." Evidently he struck a spark on the side of the hole, or struck the cordeau with his harpoon, and the three cartridges in this hole exploded. None of the charges in the holes already loaded exploded. The three men killed besides Mr. Lanier were all gathered around the hole being loaded.

This accident serves to emphasize that liquid oxygen is an explosive and should be handled with all the respect due explosives. Customary safety precautions might have helped cut down the loss of life.

New Machinery and Equipment

Force Feed Lubricator Installation

THE illustration herewith shows an interesting adaptation of a Hills-McCanna force-feed lubricator to a difficult oiling problem, the positive lubrication of a heavy-duty, apron conveyor.



Force feed lubricator solves difficult oiling problem

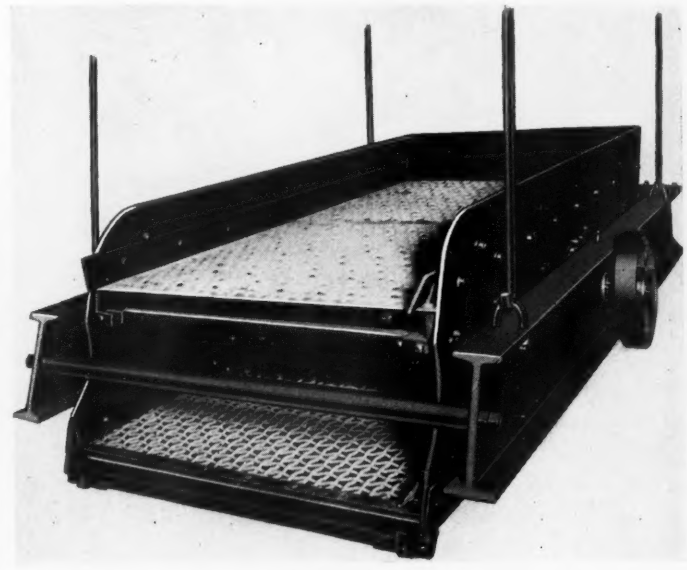
The lubricator is mounted on the under or slack side of the conveyor, and oil is forced by the pump to the brushes, as shown, through a ¼-in. O. D. copper tubing. As each link in the chain passes beneath the brushes it is coated with a coat of oil.

The lubricator used on this machine is a four-feed unit driven by a sprocket and chain from one of the main drift shafts.

New Vibrating Screen

THE J. S. MORRISON CO., Pittsburgh, Penn., announces a new vibrating screen, known as the "Summit" screen, the principal features of which are claimed to be extraordinarily rugged construction, the main frame of the screen consisting of 12-in. I-beams tied together with 3x3-in. angle irons with gusset plates at all four corners.

Another special feature claimed is a method designed to feed the material to the top deck so that it will spread out over the screen surface equally and reach the second deck as near as possible to the feed end of the screen, thus utilizing as large a percentage as possible of the second deck screening area. This is accomplished by a deflector.



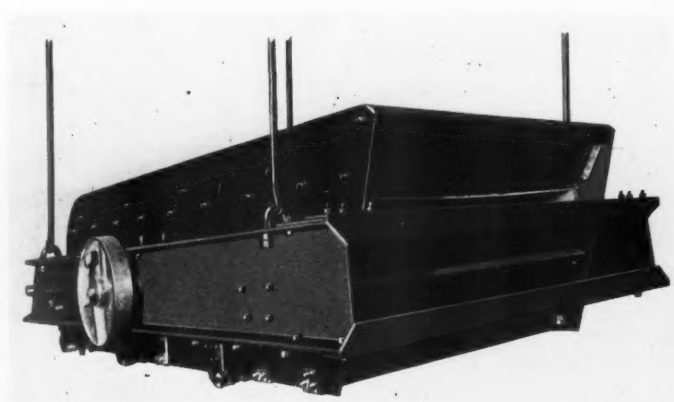
New vibrating screen designed for screening stone, slag, sand and gravel

The new screen has an oversize shaft with SKF bearings in specially designed housings. "Meehanite" metal is used in the bearing housings, flanges and flywheels. The two eccentric bearings are flanged into the side plates of the screen body close to the outside bearing to lessen the chance of deflection in the shaft. Furthermore, it is claimed that these two eccentric bearings are kept in line by the use of flanges bolted to the inside of the side plates, these being connected with a pipe over the shaft, the covering over the shaft being designed to keep dirt and grit from the bearings. The Alemite grease system is used and is designed to reach each of the four bearings independently.

The springs on which the screen rests are mounted on the bottom flange of the I-beam, out of sight, but claimed to be easy of access from the end of the beam. All bolts are machine bolts with lock washers and fitted into reamed holes.

These screens may be built with the decks at different angles so that each screen may be erected at a suitable pitch for the particular size of the material to be screened on it.

The screen frame is suspended on rods with turnbuckles, or hinged at one end and suspended at the other so that the angle of the screen frame may be changed. It may be belt-driven or driven by a motor and multi-V type rope drive from a motor mounted on the screen frame.



Screen with bearings self contained in flanged housings through I-beam frame

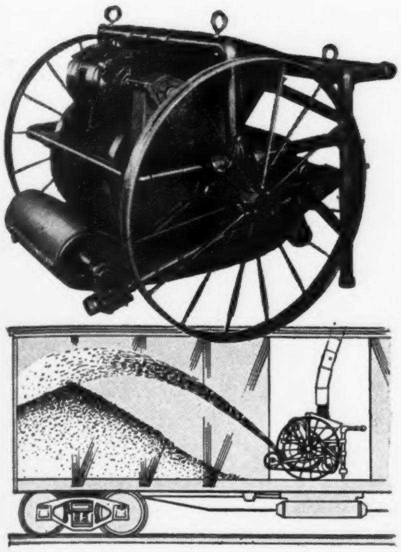
The feed and discharge chutes have baffle plates and, if required, can be mounted on the screen frame. For openings 1 in. and larger, corrugated perforated plates are recommended, rather than wire cloth.

Heavy Duty Portable Loader

THE STEPHENS-ADAMSON MANUFACTURING CO., Aurora, Ill., announces an ingenious application of centrifugal force to a new heavy duty box car loader especially designed to throw bulk material such as sand, crushed stone, or fertilizer, to the farthest corners of a box car. The machine is claimed to be so light that it can be readily handled by one man and to have a capacity of 350 tons per hour.

In operation the machine is wheeled into the car to be loaded, the motor started, material fed into the hopper and the stream thrown from the loader is directed to fill one end of the car. No further attention is needed except to swing the machine around to fill the other end.

The loader consists of a short endless conveyor belt, 30 in. wide, driven at a speed of



One-man heavy duty box car loader

2000 ft. per min. The carrying surface of the belt travels in a concave curve, held in position by two discs, touching the belt only at the outer edges. A loading hopper feeds the material between the discs, where it meets the belt traveling in a downward direction. As the load follows around the curve, centrifugal force causes it to cling to the high-speed belt. Thus, in a travel of less than 2 ft. the material attains the speed of the belt and is thrown a distance of nearly 40 ft., it is said.

The loader is driven by a Westinghouse totally enclosed motor, and all high-speed bearings are SKF double-row, self-aligning ball bearings with dust-tight grease seals and Alemite lubrication. The Morse silent-chain drive is also enclosed in an oil-tight housing.

New Manganese Welding Rod

THE STOODY CO., Whittier, Calif., announces a new manganese welding rod which is furnished, uncoated, in 28-in. lengths for oxy-acetylene welding and in 14-in. lengths with a special flux coating for electrical welding. The coated rod will run equally well, it is said, with either alternating or direct current.

This welding rod, it is claimed, has been used to build up cast manganese railway crossings and switch points, and the welds have been found to resist wear as well as or better than the original castings, with no evidence of damage to the castings in the building-up process.

In announcing this rod the company states: "For many years, in fact since autogenous welding was first introduced, the welding of manganese steel has been one of the chief stumbling blocks to all-round successful welding. Many welding rods of varying proportions of manganese and of varying analyses were introduced, but in each event the results were far from satisfactory. To date there has been every indication that the new manganese rod will fulfill any and all requirements, and, what is equally important to the user, this rod is being marketed at no increase in price over the manganese rod formerly marketed."

New Crawler Bucket Loader

THE LINK-BELT CO., Chicago, Ill., has announced a new crawler bucket loader known as "The Grizzly, 1930 Model," in which particular attention has been paid to the construction of the feeding device. This new feeder is of the continuous helical ribbon type with a self-sharpening spiral and cutting edge designed to cut, dig and convey the material to the elevator buckets in a continuous stream. The feeder's adjustment is controlled by a hand-wheel within reach of the operator, who rides with the machine on a side platform.

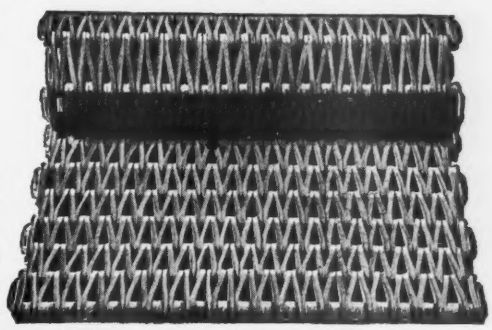
View of assembled bucket loader

The machine has a rated capacity of 1¾ cu. yd. per minute, based on handling sand, stone and gravel 1½ in. in size and smaller.

The power unit ordinarily used is a 30-hp. Buda gasoline engine or a 20-hp. electric motor, which operates the bucket, elevator, feeder, and the crawler traveling mechanism. The crawler frames are one-piece steel castings, and the crawler is designed wide and long for stability, it is claimed.

Safety Mat

TO ELIMINATE the danger of falls and accidents from slipping, the Durable Mat Co., Akron, Ohio, has placed on the market a new type of safety mat made of slotted rubber fabric, designed not only to save slipping but to furnish insulation against cold or damp floors in industrial plants of all kinds.



Safety mat of slotted rubber fabric

The mat is made in all sizes and shapes to meet any particular condition. Standard sizes carried in stock are: No. 3, 17x25-in.; No. 4, 20x29-in.; No. 6, 24x37-in.; No. 10, 30x48-in.

This type of mat has been especially recommended by safety engineers for use around machinery where a slip or fall might cause fatal consequences, and on walkways, conveyor galleries and stairways.

At the left is a view of the bucket loader screw for fine material. Right—Screw for coarse material

Sand-Lime Brick Production and Shipments in April

THE following data are compiled from reports received direct from 15 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is four less than those furnishing statistics for the March estimate, published in the April 12 issue. The statistics below may be regarded as representative of the entire industry in the United States and Canada.

Production of sand-lime brick continues to increase with the increased demand for spring construction work. Shipments both by rail and truck show a good increase; stocks on hand and unfilled orders, a decrease.

The following are average prices quoted for sand-lime brick in April:

Shipping Point	Plant Price	Delivered
Atlantic City, N. J.	$12.00	$17.00
Boston, Mass.	11.00	15.00
Detroit, Mich.	....	15.50@16.00
Grand Rapids, Mich.	....	14.50
Iona, N. J.	12.00	15.00
Jackson, Mich.	11.00	....
Milwaukee, Wis.	10.50	13.00
Minneapolis, Minn.	9.00	....
Mishawaka, Ind.	11.00	....
Syracuse, N. Y.	18.00	20.00
Toronto, Can.	11.00	13.00

The following statistics are compiled from data received from 15 producers in the United States and Canada.

Statistics for March and April

	*March	†April
Production	7,405,668	8,704,670
Shipments (rail)	2,845,670	3,682,255
Shipments (truck)	4,989,684	4,957,132
Stocks on hand	11,958,586	8,755,933
Unfilled orders	12,793,000	7,229,000

*Revised to include one plant not reporting in statistics published in April 12 issue. Nineteen plants reporting. Incomplete, one plant not reporting production, one not reporting stocks on hand, and seven not reporting unfilled orders.

†Fifteen plants reporting; incomplete, one plant not reporting production and six not reporting unfilled orders.

Notes from Producers

Walker and Frank Brick Co., Detroit, Mich., have installed a new Riddell press.

Considerable publicity work is being done by the Sand Lime Products Co., Detroit, Mich., who are sending interesting pamphlets and descriptive literature on their product to their mailing list of contractors, dealers and architects each month. Cards, carrying a photograph of an outstanding job where sand-lime brick was used, are mailed each month to these lists. The company is also supplying descriptive folder to dealers for their own use with the dealer's own name printed on them.

The sand-lime brick of the Sioux Falls Pressed Brick Co., Sioux Falls, S. D., is being used by the city of Sioux Falls for sewer and water manholes.

Recent Contract Prices

BRIDGEPORT, CONN.—The R. E. Donnelly Co., successor to the George T. McCarthy Co., will supply the city with trap rock at $1.65, $1.75 and $2.51 on screenings, 2-in. and ½-in. rock, this year. Bertolini Bros. quoted $1.70, $1.90 and $2.30 per ton. Bids on sand were referred to a committee composed of Edward P. Quinn, president of the Board of Public Purchases, and Director of Public Works John J. McGuinness for investigation.—*Bridgeport* (Conn.) *Post.*

LOS ANGELES, CALIF.—Formal approval of the county's contract to purchase 102,000 bbl. of cement to build Big Tujunga Dam No. 1 has been made by the supervisors. Riverside Portland Cement Co., the lowest bidder, offered cement at $1.85 per bbl., the lowest price ever offered the county. The former low price was $1.96 per bbl.

Big Tujunga Dam No. 1 will be constructed eight miles north of Sunland in the Big Tujunga canyon at a cost of $1,000,000. The total amount of the cement contract for this construction will be $188,700.—*Burbank* (Calif.) *Review.*

Canadian Nonmetallic Industries Growing

A SUBSTANTIAL increase in the output of asbestos in the Province of Quebec during the course of 1929, sufficient to establish a new high record for all time, is recorded in preliminary statistics made public by the Mines Department of the Province.

Although some of the asbestos mines passed through difficult times, the figures of production during the year show a substantial increase, both in tonnage and in value, as compared with 1928.

A quantity of 306,055 tons, valued at $13,172,581, was shipped from the mines last year, as compared with 273,033 tons, valued at $11,238,361, in the 12 months of 1928.

Last year marked the fiftieth anniversary of the first shipments of asbestos from the province, a few months after the mineral had been discovered in Thetford township. A special celebration took place at Thetford Mines last May in honor of the occasion.

The average value per ton of asbestos was higher last year than during 1928, $557.38 per ton for crude No. 1 being a new high record, as compared with $534.87 during 1928, while the total average value per ton of all kinds of asbestos was higher, being $43.04 in 1929 as compared with $41.16 in 1928. Stocks on hand at the end of the year totalled $2,465,337 as against $1,879,257 for 1928, the report shows.

Mica is another nonmetallic mineral which reported an increase as compared with the previous year, but its $70,281 is way short of the record $281,729 which was registered in 1920.

Feldspar, despite the new United States duty of $1.50 per ton, likewise shows a marked increase as did magnesite, this advance being attributed to exports to Great Britain.

Chief consumers of Quebec magnesite are Canadian iron and steel works, but the dead-burned material is gaining a foothold in Great Britain.

Asbestos production during the year was:

Grade	Tons	Values	Av. value per ton
Crude No. 1	802	$447,259	$557.38
Crude No. 2	2,625	870,888	331.82
Crude run of mine	931	168,226	180.69
Spinning fibre	17,545	3,110,847	177.30
Shingle fibre	34,177	2,572,216	75.26
Mill board and paper fibres	91,157	3,515,219	38.56
Fillers, floats and other short fibres	158,818	2,487,935	15.66
Totals	306,055	$13,172,581	$43.04
Byproducts (sand and gravel)	18,976	7,303	38.00
Totals	325,031	$13,179,884	....

Italian Production of Asbestos

THE Italian production of asbestos, which in 1913 was only 175 tons, has within recent years made notable strides, reaching 2160 tons in 1925, 2900 tons in 1926, and 3840 tons in 1927. Most of this is furnished by the Balangero mine; other deposits are found in Valtellina.

The Balangero mine has increased its output very markedly. In 1925 it produced 2000 tons of asbestos fiber, in 1928 it reached 5000 tons, and it is estimated that as a result of new plants it may reach an average production of 10,000 to 12,000 tons.

The Balangero asbestos is gray and is especially valuable on account of the absence of talc. It is comparable in quality to the Canadian, but is inferior to it for spinning. It is used exclusively for the manufacture of artificial stones and is classified into four groups, ranging in price from $73 to $150 a ton.

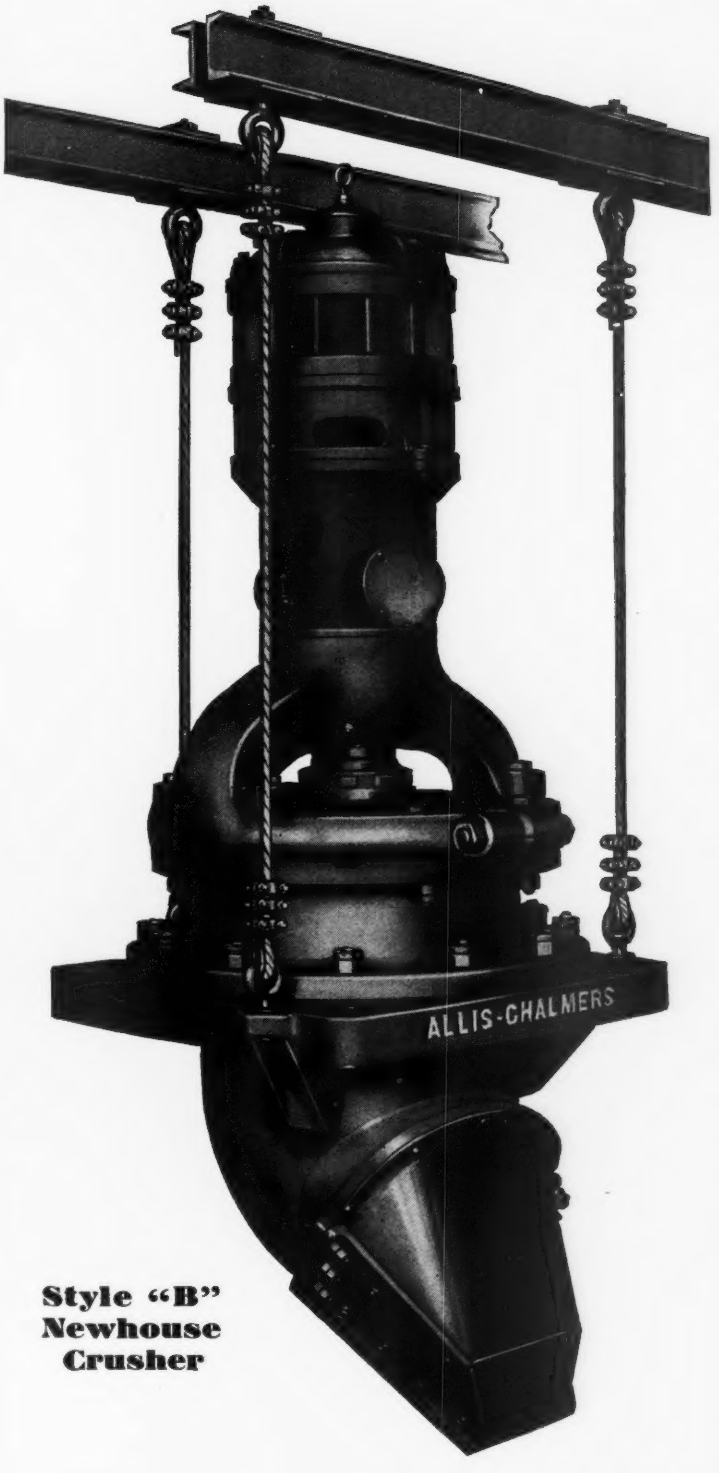
The deposits of Valtellina furnish amphibolic, white, long fiber which is resistant to acids and almost infusible. The production of these mines was 100 tons in 1925, and 240 tons in 1927. The mines are public property and are leased to private interests for operation. The output consists of approximately one-third first-class fiber 2 cm. long, one-third second-class with fibers 0.5 to 2 cm. long, one-fourth of third class with fibers less than 0.5 cm., and the remainder is powder. The first two grades are exported principally to England to be used for cartons, filters, stopcocks, etc. The fiber is rather rough and therefore little adopted for spinning. The third class and the powder are used in Italy for the manufacture of papers.

In addition to the two establishments that use asbestos in the production of Eternit, there are in Italy three large plants and other smaller ones devoted to the manufacture of various articles such as threads, cords, cartons, textiles, etc. However, Italian asbestos, which is mostly short fiber, is not well suited for textiles, and asbestos for this purpose is imported.

Since 1924 the exports of gray asbestos have increased enormously, jumping from 5670 quintals valued at 891,558 lire in 1924, to 49,404 quintals valued at 7,956,404 lire in 1928.—*Industrial and Engineering Chemistry.*

When you are buying Crushers

what points do you consider?



Style "B" Newhouse Crusher

First of all, you want a crusher that will yield best return on your money. That includes, not only first cost, but also maintenance and operating costs.

You want a crusher easy to feed and that will produce a maximum capacity of stone of desirable shape and screen analysis. It should be of simple construction with internal parts readily accessible, and that has been thoroughly tested under actual operating conditions.

The Newhouse Crusher is such a machine. Its short, rapid, crushing stroke gives it high capacity with a high percentage of the finished product of desired shape and size. It has a high ratio of reduction. Its direct-connected motor, cable suspension, positive oiling system, and simple and sturdy construction are other advantages. And it is built by a Company with over 50 years experience in the building of crushing machinery.

Products of Allis-Chalmers

Complete equipment for crushing, screening, and cement plants; mining and metallurigal plants;—jaw, gyratory and roll crushers; rotating and vibrating screens; multi-roll sizers; elevators, and hoists; washing equipment; motors, pumps and drives.

Write for a bulletin on Allis-Chalmers crushing plant equipment.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

News of All the Industry

Incorporations

Southern Mines and Quarries, Inc., Wilmington, Del., $700,000.

Ready Mix Concrete Co., Rome, Ga., $2,000. A. W. Ledbetter and G. C. McCullough.

Somerset Trap Rock Corp., 113 Central Ave., Westfield, N. J., 200 shares, no par value.

Tulsa Cement Co., Wilmington, Del., 250 shares common.

Kentucky-Tennessee Rock Asphalt Co., Nashville, Tenn., $25,000. C. M. Long, Paul Huey, J. D. Langley and John B. Strewe.

Hoadley Stone Co., Bloomington, Ind., increased capital stock 500 shares common, having a par value of $100 each.

Twentieth Century Sand and Gravel Co., New York City, $300,000 preferred and 1000 shares common.

International Non-Staining Cement Co., Inc., San Diego, Calif. To produce cement. Alfred Rene Baillif, Chamber of Commerce Bldg., San Diego.

Cumberland Stone Co., Crab Orchard, Tenn. To mine and prepare sandstone, limestone and flagstone. Newton D. Walker, J. R. Mitchell and D. L. Hembra.

C. M. Hughes Co., 826 Third Ave. N., Nashville, Tenn. To manufacture and sell cement, plaster and building materials. H. C. Ormes and John Towe.

Northwestern Sand and Gravel Co., Chicago, Ill., $100,000 preferred and 20,000 no par value common. Anne Freibert, Paul V. Byrne and A. J. Hewitt.

Greenbrier Limestone Co., Fairmont, W. Va., $25,000. A. J. Colborn, John L. Gill, Mary D. Devol, L. C. Weeks and Virginia Ashcraft, all of Fairmont.

Western Quarries, Inc., 473 Wilshire Blvd., Beverly Hills, Calif., $75,000. Laurence A. and Gertrude T. Sheriff and W. W. Wilson, Los Angeles, Calif.

Henderson Quarries, Inc., Raleigh, N. C., $10,000 preferred and 100 shares no par value common. Thomas Wakeham of Henderson and Hubert White and Morris A. Lobron of Philadelphia, Penn.

United Concrete Products Corp., Fall River, Mass., $99,000; 19,800 shares at $5 each. President, George L. Dillaway; treasurer, Frederick B. Du Verger, 59 McGowan St., Fall River; Manson M. Dillaway.

The Allen-Cummings Sand and Gravel Corp., Ashtabula, Ohio; 250 shares, no par value. Jameson A. Allen, S. D. Cummings and Walter H. Kobel.

Quarries

Michigan Limestone and Chemical Co., Rogers City, Mich., is planning a new power plant to cost over $65,000 with equipment.

Sun Prairie, Wis. At a recent meeting of the village board the city's stone quarry was ordered sold to H. E. Pease for $75,000.

Wilson Construction Co. is now operating a sandstone quarry 18 miles northwest of Las Vegas, Nev.

Nauvoo, Ill. The large quarry near the Mt. Moriah bridge south of Nauvoo has been reopened and a force of men is now employed in quarrying rock for government work.

Cooper Crushed Stone Co., Plymouth, Penn.: an involuntary petition in bankruptcy was filed against the company by several Pennsylvania concerns who claim to be creditors.

Kingston, N. Y. According to local newspapers, the crushing plant on the Kingston Fair Grounds property at Kingston, N. Y., will be reopened by the state. The quarry was closed last year, the state obtaining stone from Stony Point by boat.

F. J. Saeugling of Guttenberg, Iowa, has a contract with the government to furnish 30,000 cu. yd. of crushed rock for river work. He has leased the Martin quarry from I. E. Martin and has started operations there. Associated with Mr. Saeugling is C. J. Kipper of North Buena Vista, Iowa.

Sand and Gravel

Pacific, Mo. The gravel plant near here will be operated by the Modern Coal and Material Co.

Becker County Gravel Co. is erecting another gravel washing plant on a Northern Pacific site at Detroit Lakes, Minn.

Dayton Gravel and Sand Co., Huntington, W. Va., is reported as having filed papers of dissolution.

East Texas Gravel Co., Santa Fe Bldg., Dallas, Tex., has leased a large gravel pit nine miles northeast of Ferris, Tex., owned by Clyde F. Winn and associates.

Spring Valley, Ore. A crew of men began work recently grading a road to the site of the gravel pit here where equipment will be installed to furnish gravel for the roads in the district.

James F. Byrne is installing new equipment at his sand and gravel plant at Plasterville, N. Y. New machinery includes a complete washing plant and a new crushing plant.

Cornelius Buekema and Howard Reynolds have formed a partnership at Lansing, Mich., and will install equipment on site there to produce sand, gravel and crushed stone.

East Lansing Gravel Co., a subsidiary of the Leonard Gravel Co., is now installing equipment at its new plant at East Lansing, Mich. The plant is under the supervision of H. C. Leonard.

Whitney Materials Co., Duluth, Minn., is installing additional machinery which, according to E. A. Banister, secretary-treasurer of the company, will increase the capacity of the plant about 25%. Capacity of the plant is now approximately 10,000 cu. yd. of gravel.

Wells Pit Sand and Gravel Co., Wells Pit, W. Va., has awarded contract to the Electric Service Co. for electrifying its plant. The sand and gravel pump was formerly driven by steam, but with the new equipment the pump will be driven by a 200-hp. electric motor. Two other motors of smaller size are used for washing the sand and gravel.

West Monroe, La. The track formerly used to haul sand and gravel from the old Victory Sand and Gravel Co.'s pit near Traveler's Rest, in the northwest part of West Monroe, to the V. S. and P. main line, is being dismantled. The sand and gravel pit was worked for several years, but for the past year it has been worked very little, and at present only a small force is employed in washing sand.

Union Sand and Supply Co., Painesville, Ohio, is erecting a new distributing plant at the intersection of Johnny Cake Ridge, Chardon Road and Liberty St. Four huge bins are being erected for loading to the cars overhead, and in turn trucks can be filled from underneath the bins. Lime, tile, sewer pipe and brick will be handled at the new location, in addition to sand and gravel, and it is planned to move the company's offices here at a later date.

Cement

Universal-Atlas Cement Co., subsidiary of the United States Steel Corp., has leased more than half of the 14th floor of the Chrysler Bldg., New York City.

Cumberland Portland Cement Co., Cowan, Tenn., has transferred its sales office to Nashville, Tenn. Foster Cook, formerly with Martin A. Hayes and Co., has been appointed manager of the office at Nashville.

Kosmos Portland Cement Co., Louisville, Ky., contributed a good share of the $600 in cash prizes donated by Louisville firms for the contestants at the annual junior week at the University of Kentucky, June 9-14, which will be attended by 600 farm boys and girls. The prizes will be awarded for the best demonstrations of improved farm and home practices.

Lime

R. N. Horton Lime Co., Richlands, W. Va., is installing two kilns and erecting a storage room to hold several hundred tons of lime.

Cement Products

American Concrete Products Co., Andrews Bldg., Dallas, Tex., is said to be planning the erection of a $50,000 branch plant at Waco, Tex. F. A. Folley is Texas manager.

Nashville Ready-Mixed Concrete and Supply Co., Nashville, Tenn., is erecting a new $10,000 plant on Main St., East Nashville. While the plant and office building is under construction the company will maintain headquarters in the Fourth and First National Bank Bldg. M. F. Sills is president and general manager.

Personals

M. E. Brian has resigned as city engineer at Windsor, Ont., to become vice-president of the Cadwell Sand and Gravel Co. of Windsor.

L. C. Newlands, vice-president and general manager of the Oregon Portland Cement Co., Portland, Ore., was elected president of the Portland Chamber of Commerce at its recent annual meeting.

W. J. Savage, formerly sales manager of the Heltzel Steel Form and Iron Co., Warren, Ohio, is now with the Brown Clutch Co., Sandusky, Ohio, in the same capacity.

Robert W. Gillispie has been elected president and general manager of the Jeffrey Manufacturing Co., Columbus, Ohio. He was formerly vice-president and general manager. In addition to

Robert W. Gillispie, president and general manager, Jeffrey Mfg. Co.

being president of the Jeffrey Manufacturing Co., Mr. Gillispie is also president of two subsidiary companies known as the Jeffrey Manufacturing Co., Ltd., at Montreal, Canada, and the Galion Iron Works and Manufacturing Co. at Galion, Ohio. Robert H. Jeffrey, former president of the company, has been elected to the position of chairman of the board.

Len R. Smith has been appointed assistant director of sales for the Hercules Motors Corp., Canton, Ohio. His new duties will include supervision of export sales and sales promotion among Hercules distributors.

Francis H. James has recently joined with Transit Mixers, Inc., in the capacity of chief engineer. Mr. James has had broad experience in the construction field and for a number of years was connected with the Northwest Engineering Co. as sales engineer for the state of California. He will make his headquarters at the Transit home office in San Francisco.

Obituaries

Earl M. Bunce, superintendent of the Aetna Portland Cement Co.'s plant at Fenton, Mich., died April 7 at Flint, Mich., following an automobile accident. Mr. Bunce had gone to Detroit to confer with officials of the company. The accident occurred late in the night when he was returning home, but he was not found until the following morning, after he had been dead several hours.